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Office Paper Recovery
An Implementation Manual

SCS Engineers, Inc., Long Beach, CA

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OFFICE PAPER RECOVERY:
An Implementation Manual

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This manual gives pictorial and factual information to aid Federal government personnel who are responsible for implementing and administering office source separation programs in accordance with the high-grade waste paper recovery requirements of the guidelines.

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FOREWORD

The Resource Conservation and Recovery Act of 1976 (PL 94-580), states that:

"The Congress finds with respect to materials that:

1. millions of tons of recoverable material are needlessly buried each year;

2. methods are available to separate usable materials from solid waste; and

3. the recovery and conservation of such materials can reduce the dependence of the United States on foreign resources and reduce the deficit in its balance of payments."

This recent reaffirmation of Congressional purpose is in keeping with the provisions of the 1965 Solid Waste Disposal Act as amended by the Resource Recovery Act of 1970, under which the U.S. Environmental Protection Agency promulgated guidelines mandating the recovery of newsprint, white ledger and corrugated grades of waste paper from Federal facilities.

The Guidelines for Materials Recovery (40CFR 246), published in the Federal Register, April 23, 1976, outline procedural requirements and recommendations necessary to accomplish source separation. The following manual is designed to aid Federal government personnel responsible for implementing and administering office source separation programs in accordance with the high-grade waste paper recovery requirements of the guidelines. In addition, it should be useful to State and local governments, as well as private organizations who desire to implement similar high-grade paper recovery programs. Information on the implementation of the corrugated and newsprint recovery programs is also available in other EPA publications.

Completion of this manual marks a major turning point in the three-year effort to study the feasibility of high-grade paper recovery, to promulgate guidelines for its recovery, and to implement those guidelines in the Federal government. I would like to thank Penelope Hansen, EPA's Program Manager for Source Separation Programs, and the members of her staff, John Heffelfinger, Marie Louise Holmes, Charles Miller, and Elizabeth Tennant, for their dedicated effort on this project. In addition, I would like to acknowledge the contribution of SCS Engineers, author of this document.

SHELDON MEYERS
Deputy Assistant Administrator
for Solid Waste

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CONSIDERING OFFICE PAPER RECOVERY

Recovery of high-grade paper from office buildings is one of the fastest growing forms of resource recovery in the United States today. Hundreds of office buildings in private industry and a growing number of federal, state, and local government offices are converting from 30 to 70 percent of their wastepaper into the more profitable and environmentally beneficial category of "surplus property" through the source separation system described in this manual.

Source separation is defined as the setting aside of recyclable waste materials (in this case white, high-grade wastepaper) at the point of generation (the desk or work location) by the generator. When correctly implemented, a system of this type:

- **Conserves valuable resources** by recovering high-grade fiber, much in demand by the paper industry, and by reducing landfill space requirements.
- **Lowers environmental emissions** through the recycling process which produces less air, water, and land pollution than does virgin production.
- **Saves money** by returning revenue of $40 to $80 per ton from the sale of recovered paper and by decreasing disposal costs.

To establish an economically attractive source separation system for any material, the following criteria must be met:

- The material to be recovered must be present in the waste stream in sufficient **quantity** to justify its extraction.
- The material must have a **market value** sufficient to cover the costs of extraction and must be in demand by industry, thereby warranting long-term purchase contracts.
- A proven low-cost **method of separation** at the source must be available.

For many office facilities, the recovery system described in this manual will meet these criteria.

QUANTITY

Office building waste streams are composed primarily of various grades of paper. Metals, glass, and other materials commonly found in the municipal waste stream are present only in small amounts.

The amount of waste generated per employee varies both within and between buildings housing different types of offices. Major factors affecting generation rates include type of organization, in-house paper generating activities such as data processing, printing, and copying, and other paper uses. EPA office waste surveys show that bank and insurance type facilities generate an average of 2.31 lbs. of waste per employee per day. Ninety-three percent of this material (2.17 lbs. per employee) is paper. General office facilities surveyed generated an average of 1.55 lbs. of waste per employee per day, of which 1.32 lbs., or 85 percent, was paper.

MARKET VALUE

Since so large a percentage of the typical office waste is paper, the criteria of quantity is met. But is the value of this material high enough to justify extraction?

Paper is sold by grade. The value of each grade is established by specifications set by user industries. Examples of individual grades are newsprint, computer tab cards, white ledger, colored ledger,

COMPOSITION OF OFFICE SOLID WASTE BY BUILDING TYPE*

Material	Generation/Building Type (lbs/employee/day)			
	Bank/Insurance Co.		General Office	
	Average	%	Average	%
Paper				
Computer Tab Cards	0.39	17	0.05	3
Computer Printout	0.70	30	0.11	7
White Ledger	0.70	30	0.51	33
Subtotal (High Grades)	1.79	77	0.67	43
Colored Ledger	0.12	5	0.09	6
Newspaper	0.07	3	0.25	16
Corrugated	0.05	2	0.14	9
Other†‡	0.14	6	0.17	11
Subtotal (Paper)	2.17	93	1.32	85
Non-Paper‡	0.14	7	0.23	15
Total	2.31	100	1.55	100

*Based on representative solid waste sampling conducted at six buildings studied by EPA; does not include cafeteria waste.

†Generally non-recyclable paper: carbon paper, wax coated or impregnated paper products, etc.

‡Small quantities of garbage, metal, plastic, glass, textiles, wood and other materials.

kraft paper, etc. Paper types can also be combined to make designations such as "mixed ledger" or "mixed paper." (See Appendix D, PAPER GRADE DEFINITIONS.) The value of the mixed material, however, will be close to that of the least valuable grade present in the mix.

Scrap paper recycling center.

Prices paid by industry for representative grades of paper in major cities in 1976 were as follows:

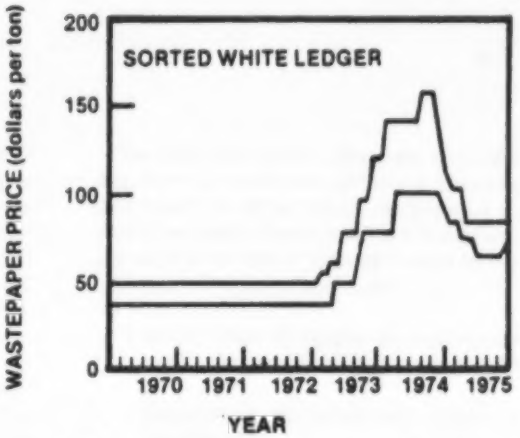
Grade	Price Range ($/ton)*
Manila tab cards	165-220
White ledger paper	70-100
Newsprint	20-40
Corrugated boxes	10-45
Mixed paper	5-20

Separation of the less valuable paper grades such as newsprint or corrugated boxes is usually impractical because of the relatively low quantities found in most office buildings in addition to the associated handling costs. Recovering this incidental amount of material will, under most circumstances, not be economically attractive.

However, if the white ledger paper generated at employee desks, print shops, and reproduction machines, together with computer paper generated at computer terminals, is recovered, the revenue will frequently justify recovery. The substantial and sustained market value of white ledger, which includes white and computer papers, is seen below.

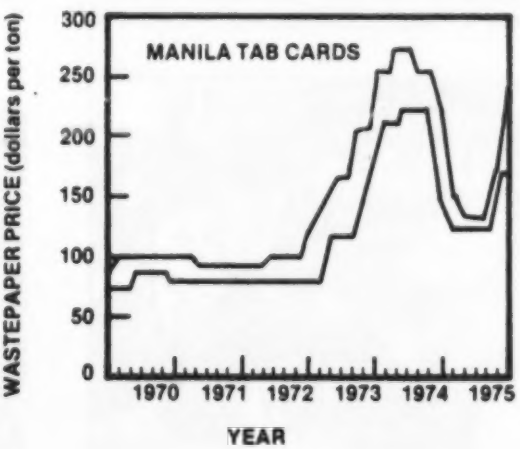
*Official Board Markets. 52(1-25). Jan. 3-June 19. 1976.

Historical market values for white ledger



Tab cards, already recovered in computer centers by many organizations, also have a substantial market value in a separated form as shown below. Although they usually represent a smaller percentage of an office's waste stream than white ledger, their high value and concentrated point of generation in computer centers provide incentive for continued separate recovery and sale.

Historical market values for manila tab cards



EPA data indicate that under present market conditions, tab cards and high-grade white paper are the most economically feasible material to recover from office waste streams. Mixed paper recovery programs may capture a slightly higher percentage of the waste stream, but the result will be an overall reduction in revenues with a corresponding adverse effect on program economics. As white ledger and computer paper constitute 30 to 80 percent of average office waste, the collection of this grade will still significantly reduce the tonnages to be disposed of while returning substantial revenues to offset the costs of collection.

METHOD OF SEPARATION

Several methods have been used for separating and collecting recyclable high-grade wastepaper from office buildings. The optimum system is determined by the ease with which it can be incorporated into daily office routines. EPA has evaluated the various methods in a wide variety of applications.

The desk-top system, basically a modification of the central container system, is a relatively new approach to office paper recovery. It consists of up to five basic operations from the point of paper generation at the employee's desk to the point of delivery to the sales contractor:

- Separation of paper and accumulation in vertically designed desk-top containers.
- Depositing accumulated paper in central containers.
- Collection of recovered paper from central containers.
- Storage of the recovered paper.
- Delivery to the sales contractor.

Three basic approaches exist: the dual wastebasket, central container, and desk-top systems. The dual wastebasket and central container systems are the more traditional. Under the dual waste-

Central container system

Desk top container system in use.

basket system, each employee is provided with two wastebaskets – one for recyclable paper, and one for all other waste. The building custodial staff collects the contents of each basket independently or simultaneously.

Under the central container system, separated recyclable paper is carried by each employee to a container centrally located in an office complex. All other solid waste is placed in wastebaskets and is handled separately.

The first two operations are performed by office employees. The other steps are performed by one or more of the maintenance or general service labor groups within the building.

Under this system, each employee places all high-grade wastepaper in a small vertical container located on his or her desk. White or natural-colored high-grade wastepaper products acceptable under most desk-top recovery programs are:

- Letterhead, stationery, typing paper, and tablet sheets, including white tissue copies.
- Bond and carbonless computer printouts.
- Carbonless and miscellaneous business forms.
- Plain bond copy paper (not coated).

Items generally unacceptable are:

- Envelopes.
- Colored and carbon paper.
- Rubber bands, plastics, paper clips.
- Newspapers, magazines, and glossy or slick paper.
- Cardboard or chipboard.
- Chemically coated paper, gummed labels, adhesives, tablet bindings.

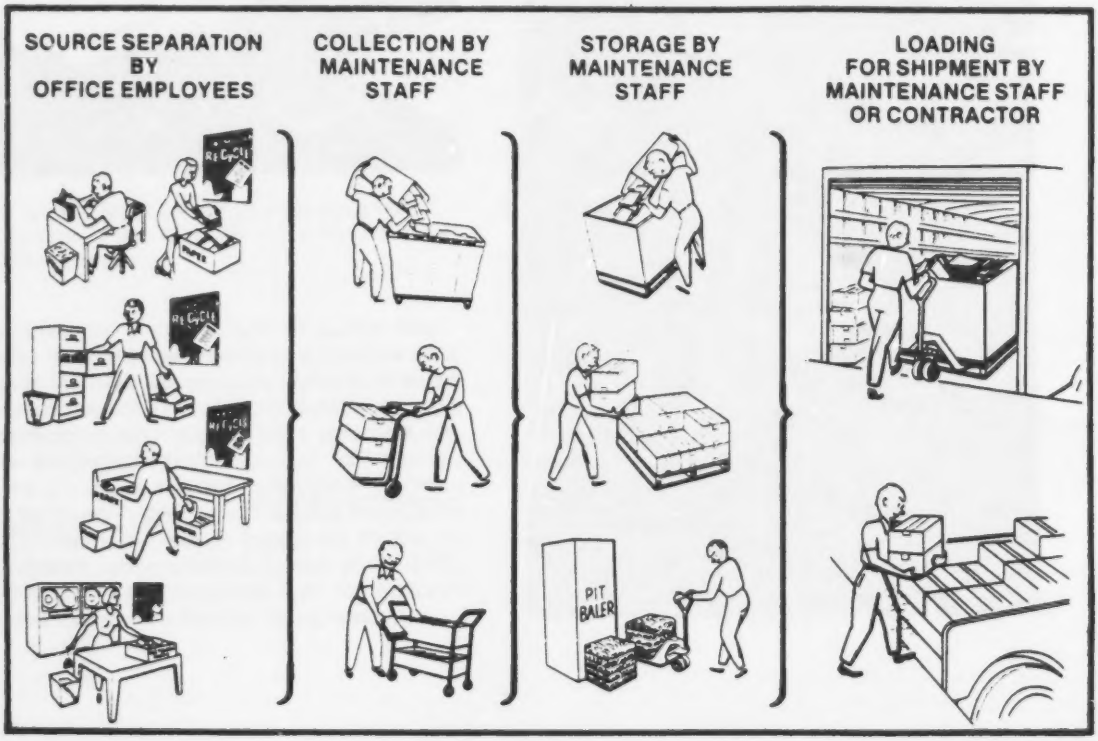
When the container is filled, the employee deposits the accumulated wastepaper in a central container conveniently located in the office vicinity. The central container approach is maintained in departments where employees are not "desk oriented" and where large quantities of uncontaminated paper are generated, such as computer rooms and print shops. The paper is collected from the central containers by a member of the maintenance staff and transported to a central storage area. Non-recyclable waste is deposited in wastebaskets as before.

Central container system in use.

EPA studies have shown the desk-top container system to be the most effective of these three systems, in "skimming" a specified grade of recyclable paper from the office waste stream. The desk-top system surpasses the other two systems in employee participation, the value and percentage of the waste stream recovered, and in the maintenance of acceptable contamination levels.

There are several reasons for this favorable performance:

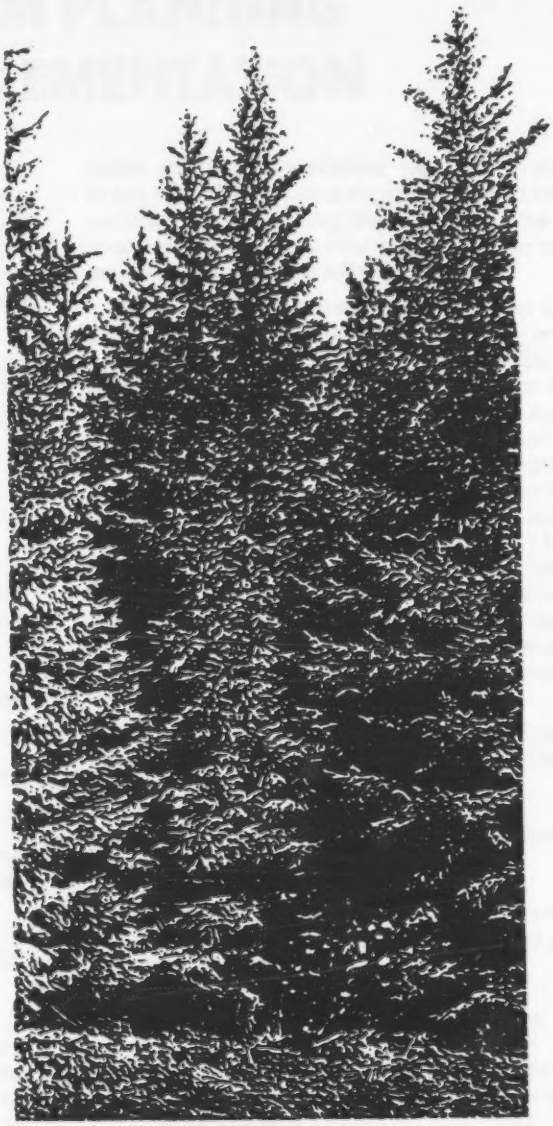
- Use of the small but accessible, vertically designed container quickly becomes habitual. Participation rates are high, but no loss in employee productivity is experienced because paper can be stored in desk-top containers for extended periods of time before emptying is required.
- Contaminants such as apple cores and soda bottles cannot be placed in the container. Colored paper is easily spotted if it is inadvertently placed there.
- Collection costs are minimized through the "volunteer" labor of each employee who per-


SOURCE SEPARATION BY OFFICE EMPLOYEES
COLLECTION BY MAINTENANCE STAFF
STORAGE BY MAINTENANCE STAFF
LOADING FOR SHIPMENT BY MAINTENANCE STAFF OR CONTRACTOR
PIT BALER

forms a major part of the collection function by transferring the accumulated paper from his or her desk-top container to the central collection container.

Due to its vertical design, this desk-top container requires considerably less desk space than horizontal desk-top containers.

The remainder of this manual will outline procedures for the implementation and economic evaluation of the desk top recovery method. Relevant data from EPA case studies and reports are used for developing time requirements and cost estimates. Additional information can be obtained from the EPA report entitled Optimization of Office Paper Recovery Systems which formed the basis for this document. The report, produced for EPA by SCS Engineers (under contract number 68-01-3192) dated May, 1976, is available from the National Technical Information Service, Springfield, VA.



SOURCE SEPARATION PROGRAM PLANNING AND IMPLEMENTATION

Source separation of high-grade office paper through desk-top programs is a materials-handling activity which generates products to sell. This is a relatively new activity which differs in scope, planning, and implementation from the usual solid waste management activities of most office building organizations.

The five major phases of the planning, implementation, and operation of an office paper recovery program include:

- Designation of a program coordinator.
- Establishing contracts for the sale of the recovered paper.
- Development and implementation of the collection and storage system for recovered high-grade wastepaper.
- Performance of the employee publicity and education program.
- Reinforcing the newly developed recycling habit.

Employe participation and the amount of material recovered are a direct function of how effectively these five activities are performed.

DESIGNATION OF A PROGRAM COORDINATOR

The program coordinator's function is to act as a liaison among upper management, maintenance supervisors, building managers, employees, and sales contractors. Administrative duties and responsibilities include establishing final sales contract provisions, developing and implementing the employee publicity and education campaign, and working with all concerned management, custodial, shipping and receiving personnel in developing the collection and storage system. Ongoing activities include tracking the operation of the program and providing a prompt response to problems that may develop with employees.

The employee publicity and education campaign is the most important aspect in the implementation of programs involving a majority of employees within a facility. Initially, the major component of the campaign is employee education sessions. It is at this point that program implementation actually occurs. Employees are expected to begin recycling paper immediately after they have attended the sessions. All appropriate publicity materials and collection equipment must have been distributed by this time, and the collection system must be functioning to ensure that the paper is collected on schedule. As a result, all other implementation activities are generally scheduled around the target dates of the employe education sessions.

The program coordinator should develop an implementation schedule that consists, at a minimum, of the following key activities:

- Issuing invitations for bids and sales contract award.
- Developing target dates for the employee education sessions and the subsequent publicity campaign.
- Determining central container locations.
- Setting up the collection system which includes establishing availability dates for labor and equipment.
- Establishing dates for storage space availability and initial deliveries to the sales contractor.

An individual should be assigned, or volunteer to serve, as a program coordinator. This coordinating function is essential for the program since it involves the participation of all employees within the organization. The time required to coordinate the program will vary depending upon the size of the organization, the configuration of the building, and the services that will be provided by either existing administrative functions or the paper sales contractor. In most cases, one person is assigned to perform this task. However, in large buildings, or when one individual does not have sufficient time to perform the task, more than one person can be assigned on a part-time or full-time basis.

Planning and organizational talent, coupled with enthusiasm and an ability to communicate with others, are qualities to look for in the program coordinator. His/her interest areas should include cost and waste reduction and environmental control. Personnel at the administrative level who are eager to show their abilities are possible choices for coordination work.

The administrative requirements for these activities are substantial during program implementation, but tend to decrease and level off once stable operation is achieved. Case studies indicate the importance of initial administrative and educational activities in maximizing employee participation and minimizing contamination levels. EPA's experience has suggested that there is a tendency to under-estimate the administrative time requirements associated with the implementation and operation of paper recovery programs. The importance of allocating a sufficient amount of manpower for these purposes cannot be over-emphasized.

In multi-tenant buildings, one person from each organization should be designated to assist a central program coordinator in scheduling education sessions and other program implementation activities. Central program coordinators generally are selected from the organization with the largest number of employees housed within the facility.

The following sections provide a basis for setting up a schedule of target dates for program implementation activities.

ESTABLISHING SALES CONTRACTS

The first task of the program coordinator is to finalize sales contract provisions. Initial market studies to determine material specifications, the services and equipment sales contractors are able to provide, and potential revenues, are conducted as part of the program feasibility study discussed in the third chapter, Projecting the Economics of Paper Recovery. Final contract negotiations (which the program coordinator becomes involved with at this time) include developing and issuing requests for bids and awarding contracts.

In federal, state, and some local government agencies, these tasks may be performed by a service branch of the respective level of government having the responsibility for procuring supplies and selling excess property. The General Services Administration (GSA) for federal civilian agencies and the Defense Logistics Agency (DLA) are good examples. The program coordinator, in these cases, works with the GSA or DLA contracting officer managing the wastepaper sales arrangements. Facilities that are not under the auspices of a separate contracting branch within government or private organizations independently will negotiate for sale of recovered paper.

Contacts made through the initial market study should be followed by a request for bids from prospective buyers and awarding of formal contracts. As an example of this procedure, the federal government (GSA) uses a four-step process to estab-

lish contracts for the sale of recovered paper:

- Identification of the amount and location of wastepaper to be sold
- Development and distribution of an invitation for bids (IFB)
- Receipt and evaluation of bids
- Award of contract

A sample IFB developed and used by GSA for marketing high-grade wastepaper is presented in Appendix B.

Major elements of the IFB include:

- Scope and term of the contract.
- Description, grade, and location of wastepaper to be sold.
- Estimated generation rates.
- Packaging and delivery procedures.
- Storage capabilities and minimum shipment quantities.
- Services and equipment to be provided by the contractor.
- Services and equipment to be provided by the facility.
- Pricing mechanism for establishing billing prices.
- Example of computation and evaluation of bids.
- Special sale terms and conditions, e.g., anticipated collection schedules, method of award, and recycling program requirements and responsibilities.

Final award of the contract is based on an evaluation of all the bids that are received. The ability of the contractor to meet the requirements of the IFB and the highest monetary return to the government serve as the basis for this evaluation. The contractor's collection program is subject to pre-award inspection in many situations where the bids are for the "full-service" type contract discussed below.

The type and term of the paper sales contract is of primary importance for receiving maximum net revenues. Sales contracts should guarantee that paper be purchased for a specified period of time or term. This is usually possible when wastepaper generation rates consistently exceed one to two tons per month at a particular location.

Consistent generation rates coupled with the capability of storing large quantities of paper will enable an organization to take advantage of relatively higher prices paid by large-volume term-contract markets. For example, GSA specifies that paper be purchased for a minimum of one year; and for optimally more than one year with a renewal option for an additional period of time.

Traditionally, recovered wastepaper has been sold in bulk form to paper stock dealers either on a day-to-day negotiated basis, a lot-sale basis, or under short-term agreements. These dealers usually provide certain types of central storage containers and pickup service for separated paper. They, in turn, process, bale, and ship the paper to mills producing paper products.

Longer term "full-service" contracts now being entered into by GSA and many private organizations are becoming available from an increasing number of companies (see Appendix B). These contracts provide a wide variety of services and equipment such as desk-top containers, central collection bins, pallets, and shipping boxes. In addition, assistance may be offered in program implementation and management, including employee education sessions and educational materials.

The cost for providing equipment and services under this "full service" arrangement is included in the net price paid for the recovered paper. As a

result, direct costs incurred by facilities for equipment and services are significantly reduced.

Individual facilities not under the auspices of a separate contracting branch within government or private organization must determine the optimum contracting arrangement. If the contract is only for the sale of paper, manpower and equipment start-up costs and requirements must be included in cost calculations. The arrangement providing the greatest long-term net revenue return should be selected. The responsibilities of the facility and contractor during the implementation and subsequent operation of the program under these two contracting approaches are shown below.

When finalizing contract provisions, the following factors affecting program costs and revenues must be considered:

- **Market Value.** High-grade wastepaper is usually sold on a weight basis and has a market value which is quoted by the various paper industry trade publications for major cities. The market value depends upon the grade, acceptable contamination level, and distance from the ultimate consumer. The contractor may specify that the recovered paper has to comply with specifications outlined in the Paperstock Standards and Practices, PS-74. This pamphlet, issued by the Paperstock Institute of America, lists paper grades and allowable contaminants. The contractor may request the right to downgrade the value of the paper or reject the load entirely if contract specifications are not met. Appendix D provides a listing of grade definitions. White high-grade paper is classified as #1 sorted white ledger.

- **Pricing Mechanism.** Three basic methods exist for establishing prices under term contracts: fixed prices for the term of the contract; periodic review and adjustment of prices; and floating prices tied to a paper industry market index.

  Fixed prices are most appropriate for short-term contracts. Floating price mechanisms or periodic reviews and adjustment of prices are used for longer term contracts to protect both parties in the event of price fluctuations. These are quoted as a percentage of a paper industry market index, such as Official Board Markets, for major cities. Guaranteed mini-

CONTRACTOR/FACILITY PROGRAM ELEMENT RESPONSIBILITY

Contract Approach	Program Element					
	Plan and Develop	Procure Materials and Equipment	Publicity and Education	Implement and Shakedown Program	Operate Program	Transportation of Recovered Paper
Sale of Paper Only	[redacted]					Contractor
Full Service	[redacted]	Facility/ Contractor	Contractor		Facility	Contractor

mum floor prices should be included in floating price contracts. This is to protect the generating facility in the event that the price falls below its break-even point for program operation.

Longer-term multi-year contracts are of interest to purchasers who provide full-service recycling programs in which significant implementation and operating costs must be recovered.

- **Storage and Transportation Requirements.** Transportation of recovered paper from the facility to markets is almost always provided by sales contractors and the cost may be included in the net price for the paper. Higher unit prices can usually be negotiated if a facility is able to guarantee economic shipment quantities. Facilities with adequate storage space may want to take advantage of lower contract shipping charges or higher per ton prices by contracting for 1 to 5 ton minimum shipping quantities.

  The way in which the paper is stored and packaged can also affect its value. Handling requirements are reduced when the wastepaper is stored in bulk quantities in large containers such as roll-off bins or pallet-size boxes. Some contractors pay a premium for baled paper, if a low contamination level is guaranteed. Others prefer that the paper be stored in boxes or bins so that they can scan for contaminants prior to baling.

- **Point of Pickup.** Contractors may remove source-separated paper from central container locations, central storage areas, or loading docks. Office building employees may perform all of these services. Generally, the further into a building a sales contractor must go to collect paper, the less the F.O.B. (freight on board) price will be for the paper because of increased labor costs.

DEVELOPMENT AND IMPLEMENTATION OF THE COLLECTION AND STORAGE SYSTEMS

From the point of paper generation at the employee's desk to the point of delivery to the sales contractor, the desk-top container system consists of the five basic steps previously outlined (see page 4). Office employees are entirely responsible for the first two stages of (1) separating the paper and accumulating it in a desk-top container, and (2) depositing the accumulated paper in central containers. The remaining three steps of collection, storage and delivery to the sales contractor are the responsibility of one or more of the maintenance or general service labor groups within the building.

Equipment used in these collections are:

- Desk top containers;
- Central collection containers;
- Hand carts, wheeled bins or dolleys for in-house collection;
- Central storage containers or equipment such as corrugated containers, pallet-sized boxes, pallets, storage bins, balers, or compactors;
- Handling equipment such as pallet jacks and forklifts, and a loading dock area.

Development and implementation of the collection system includes:

- Procurement and distribution of desk-top containers;
- Determination of central container locations and the procurement and distribution of central containers;
- Designation of program monitors;
- Acquisition and routing of collection personnel;
- Collection equipment modification or procurement;
- Acquisition of storage space and handling equipment.

Procurement and Distribution of Desk-Top Containers. Desk-top containers are usually plastic, solid in color, and designed to hold accumulated paper vertically.

Containers measuring approximately 4 inches wide by 6 inches long with two sides 6 inches high are the most suitable because of their stability and

large paper capacity. They also occupy considerably less desk space than horizontally designed containers. Verticle file holders of this design may be available from local office supply stores. Full-service contractors provide this type of desk-top container including a list of acceptable and non-acceptable paper grades printed on the side.

Desk-top containers.

Desk-top containers are supplied to each desk employee, usually during program education sessions. At smaller facilities, containers may be distributed to employees at their desks before, during, or after education sessions.

Determination of Central Container Locations and the Procurement and Distribution of Central Containers. A range of from 15 to 25 general office employees should be served by one container centrally located in the work vicinity. Hallway entrances into office complexes are excellent sites for central containers because there is minimum interference with office activity. Employees can conveniently deposit separated paper as they leave the office, and collection crews easily can spot central containers from the hallways when they make their rounds. Central containers also should be placed in computer centers, record rooms, reproduction machine rooms, and other areas with a high rate of paper generation. Whenever possible, containers should be placed on top of tables to maximize their accessibility and visibility.

Central container location in a computer center.

The ideal size for a central container is approximately 1-ft. high by 1-ft. wide by 1½-ft. long. This allows for sufficient paper storage capacity (2 to 3 days) in general office complexes without being too bulky. In addition, a container of this size conveniently can be placed on top of or under a table or desk.

Central container placed on the top of a table.

Fiber, canvas, or plastic bins, cardboard boxes, or some type of modified wastebasket are used as central containers. They should be easily identifiable as part of the paper recovery program and must be acceptable for use in office lobbies and computer centers. Using containers that are similar in appearance to wastebaskets should be avoided because of the obvious potential for employee confusion.

Many smaller paper recovery programs use old corrugated boxes in which supplies were shipped. These serve as temporary paper containers at the central container locations prior to being sealed and transported to a central storage area. Under this system, corrugated boxes become available for recycling after the paper they contain has been emptied.

Permanent containers are used in larger programs to minimize the storage and handling of used boxes. They should be clearly marked as storage containers for high-grade paper. A list of ac-

ceptable and unacceptable paper items should be posted near each container. In addition to desk-top containers, "full-service" contractors usually provide permanent central containers meeting the above criteria.

All central containers must be distributed before the commencement of the staff employee education sessions but after the distribution of the program "kick-off memo" (discussed in the publicity and education section). A memo should accompany each container explaining this step of the program implementation. Specific dates should be established by the program coordinator for people helping in this activity. The program coordinator, acting as a liaison between the building maintenance staff and sales contractor, coordinates and usually participates in this activity.

Designation of Program Monitors. A person working in an office where central containers are located and who is familiar with the program operation should be assigned to monitor central containers for contaminants, and to assist anyone who may have questions about the acceptability of certain types of paper. This particularly is important in high-generation areas such as print shops or computer centers. In addition, monitors can prepare the box for pickup if a temporary container system utilizing old corrugated boxes is used.

Acquisition and Routing of Collection Personnel. Various approaches are used to transport the paper deposited by office employees at the collection point to central storage areas. The most common approach is to collect separated paper from central containers, review it quickly for contaminants, and then stack or place it on a delivery or bin-type hand cart, or in an extra sack or barrel on a maintenance cart for transport to the storage area.

Most recovered paper collection operations can be integrated with existing building maintenance

A permanent central container and recycling system.

functions. Depending upon what waste collection activities exist within the facility, the separated paper may or may not be transported simultaneously with other waste to a central storage area. However, a formal collection system of some type must be developed for recovered paper, particularly in buildings housing over 500 employees. For example, central collection containers serving 20 office employees may require servicing two or three times a week to avoid overfilling. Central containers located in computer and record centers or other high-generation areas may have to be serviced daily.

The diversion of recovered paper from the waste stream will reduce the amount of waste going to disposal. This will tend to free up some custodial time which may then be allocated for paper collection. To avoid possible contamination problems, simultaneous collection should be considered **only** if the recovered paper easily can be kept separate from the trash upon collection.

Smaller buildings housing from 100 to 500 employees usually allocate some form of part-time labor for collecting recovered paper since paper generation rates are not high enough to warrant the addition of full-time collection labor. In most situations, facilities with over 2,500 employees will have to allocate at least eight man-hours per day or a full-time position to ensure efficient collection of recovered paper.

Some organizations studied by EPA have utilized existing personnel to collect recovered paper. The collection usually is made by supply handling, mail distribution, maintenance or general services personnel since the handling requirements of recovered paper are similar to materials such as copy paper and other boxed, palletized or packaged supplies.

If an organization must hire additional labor to handle paper collection, all hiring options should be investigated. Many government agencies and private organizations participate in temporary or full-time hiring programs for local high school or college students, minority and deprived groups, or handicapped people.

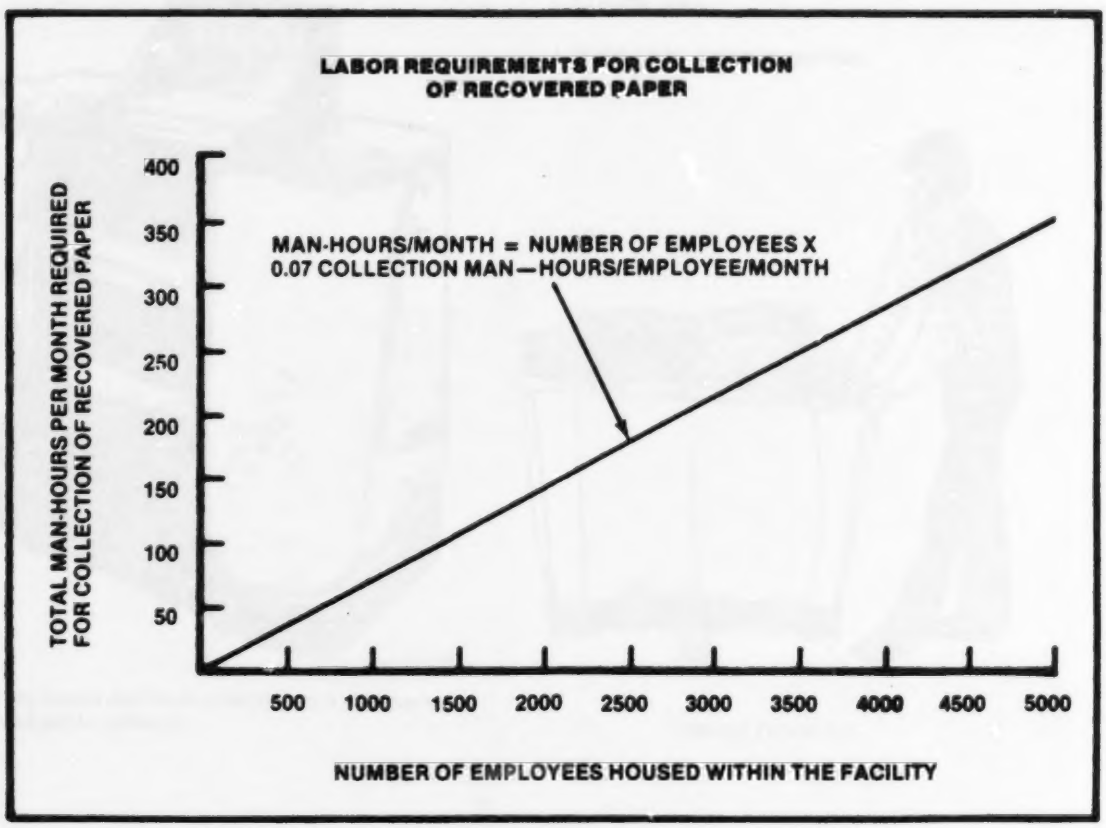
Central container being emptied into a bin-type hand cart.

Typical maintenance cart suitable for use in a paper recovery program.

Such programs should be considered as viable sources of prospective labor. It is important, however to maintain as low a personnel turnover rate as possible, particularly in larger programs where familiarity with paper collection points is important. A permanent employee added to the general services or maintenance staff may be more appropriate.

Many organizations initiate a swing system in which a pool of general service employees alternate on a daily basis to collect the paper. Contracted maintenance or general service agreements can also be renegotiated to include the additional labor requirements of separate paper collection. Regardless of who collects the paper, the program must be closely supervised since collection reliability is essential for maintaining high participation rates.

Collection personnel must be available to begin servicing central collection containers as soon as the program begins. In large buildings, it may be beneficial to conduct a "dry run" before program implementation. In so doing, the collection staff is familiarized with central container locations. Generation rates at specific central container locations determine how frequently they must be serviced. As previously mentioned, central containers serving 20-25 people in general-purpose offices should be emptied two to three times a week. Computer and copy centers, file rooms, and print shops should be



serviced daily.

Optimum collection routes can be planned based on the locations of central containers and elevators. A month of program operating experience will help to optimize collection routes and establish the proper frequency of collections.

COLLECTION EQUIPMENT MODIFICATIONS OR PROCUREMENT

Three types of equipment used in office buildings may be suitable for use in collecting source separated paper:

- Mail and correspondence distribution equipment.
- Supply distribution equipment.
- Maintenance and waste collection equipment.

Many facilities "piggyback" the paper collection function onto one of these by using or modifying existing equipment or by procuring additional equipment. Pieces of equipment commonly used in office buildings that should be considered for use in collecting recovered paper are:

- Wheeled canvas bins or barrels.
- Mail carts.
- Canvas bags.
- Hand carts, dollies or gurneys.

A cleaning supply and trash collection cart suitable for recovered paper collection.

Wheeled canvas bin.

Collection approach varies depending upon how the paper is handled, the building size, and the type of labor used. Source-separated paper, which is essentially surplus material, is best handled in a manner similar to supply distribution. The human expertise and type of equipment used for handling supplies, such as flat bed carts, pallets, and pallet jacks, are best suited for the handling of large volumes of recovered paper. Other programs use canvas sacks or containers previously used to collect trash. Programs that collect and store recovered paper in used corrugated boxes employ hand dollies for collection.

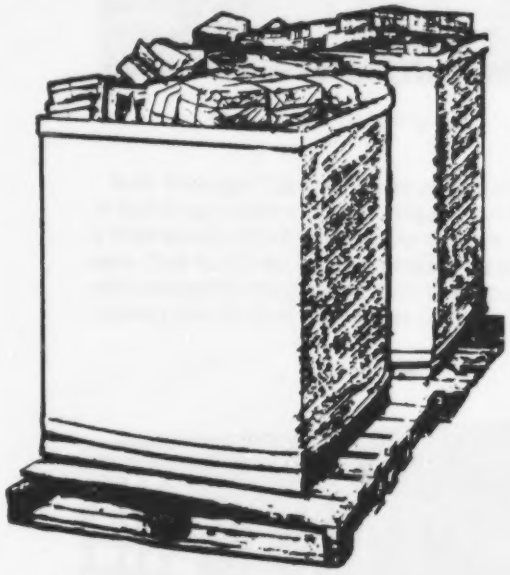
Most methods for collecting and handling high-grade wastepaper are similar to other materials-handling activities within the facility. Many facilities as a result, already may have mail carts or waste collection equipment available that can be used to collect separated paper. This existing equipment often can be modified for paper collection by adding separate compartments or shelves. Many organizations, however, are forced to procure additional equipment because suitable existing equipment is lacking, or to develop a new paper collection system. Factors such as hallway width, type of floor covering, and freight elevator size must be taken into account when determining the type of equipment to purchase. In addition, hand vehicles should have sufficient capacity to minimize off-route trips to central storage areas.

Mail cart.

ACQUISITION OF STORAGE SPACE AND HANDLING EQUIPMENT

Contractor requirements and available storage space and equipment are the two primary factors to consider when developing procedures for storing recovered paper. Contractors may offer implementing organizations economic incentives by specifying minimum shipment tonnages, baled paper, or delivery or packaged paper using facility personnel and equipment. Facilities must identify their maximum storage and delivery capabilities so contracts can be negotiated that take advantage of such incentives. This storage area should be secure to minimize inadvertent contamination and to meet local fire regulations.

There are three basic techniques for storing recovered paper: palletizing, baling, and bulk storage.



Pallet-size boxes capable of holding up to 1,500 lbs. of paper.

Palletizing. Most buildings without extensive storage facilities palletize recovered paper in used corrugated boxes or pallet-size boxes. Corrugated boxes must be uniform in size, completely filled, and sealed to facilitate banding operations and to prevent the breakage of pallets during transportation. Pallet-size boxes must be constructed of a heavy corrugated material or banded to prevent breakage during handling operations. These boxes should be covered during paper storage to prevent contamination and reduce fire hazards.

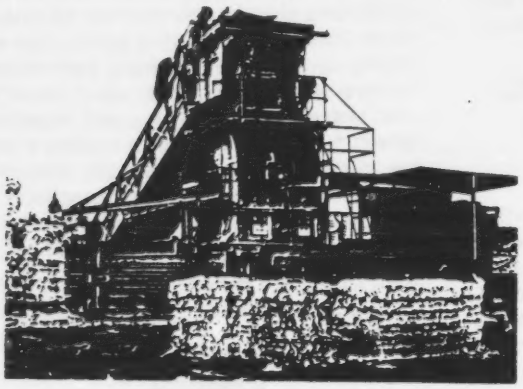
Pallet jacks or forklifts are necessary to move full pallets of paper since standard 4-ft. x 4-ft. pallets can weigh between 1,200 and 1,500 lbs. If the building has no loading facilities or pallet-handling equipment, the paper must be stored in corrugated boxes or similar containers that can be individually loaded onto a truck.

Baling. In a few office buildings with source-separation programs, the recovered paper is baled. There are no conclusive results available on the applicability of baling for source-separated paper. However, EPA data indicate that it is only feasible with pit-type or chute-fed balers. Loading a hand-fed, above grade baler requires an excessive amount of "off route" time. However, high speed pit-type or chute-fed balers are considerably more expensive than the smaller hand-fed balers.

The main purpose of baling is to reduce volume and to facilitate handling of recovered paper without the use of rigid storage containers. Bales can also be stacked to reduce storage space requirements. Recovered high-grade paper, however, packs uniformly with high density in a loose form in bulk containers. The loose volume of high-grade paper is generally reduced very little after baling.

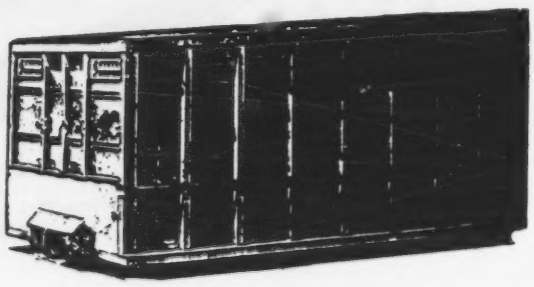
Many contractors prefer that paper not be baled because of potential contamination problems. Scanning or checking baled paper for contaminants is not economically feasible. A facility would risk the rejection of an entire bale by the contractor if an excessive amount of contaminants was visible at the time of delivery. Unless a building is already equipped with a high speed baler or can

obtain a significant premium for baled paper, baling may not be economically justifiable due to high capital and operating costs.



High grade paper being baled.

Bulk Storage. Paper is stored in bulk containers at buildings where indoor baling or pallet storage is impractical or where outdoor storage is necessary. One to 3.0 cu. yd. bins and roll-off containers with capacities ranging from 20 to 30 cu. yds. are among the types of containers used for bulk storage. Bulk containers should provide such adequate protection from weather and other adverse conditions to prevent contamination and soaking of the recovered paper. In addition, they must be clearly identified for use only as storage space for recovered paper.



30 cubic yard roll-off container.

STORAGE HANDLING EQUIPMENT

Equipment for handling stored paper is closely related to how the paper is packaged. If paper is stored in large containers such as pallet-size boxes or bales, for instance, a pallet jack or forklift and a level storage and loading dock area will be required for handling and shipping the paper.

Forklifts are used on shipping docks to load palletized paper.

COLLECTION AND STORAGE OF CONFIDENTIAL WASTES

Many office facilities generate large amounts of confidential material that is on high-grade recyclable paper but which, due to regulations or policies, must be incinerated or shredded. Handling requirements for confidential records and documents are very similar to collection procedures for source-separated paper. Shredded high-grade paper, however, is usually not as marketable as unshredded paper, because it is less dense and contamination is difficult to control. Sensitive material can be source separated and regulations for handling confidential material may be met if the collection process is closely monitored and storage is in a secure area.

The building manager and sales contractor must carefully evaluate the storage and shipping capabilities of the facility to determine the best method of handling paper.

Sealing a corrugated container used for holding recovered paper.

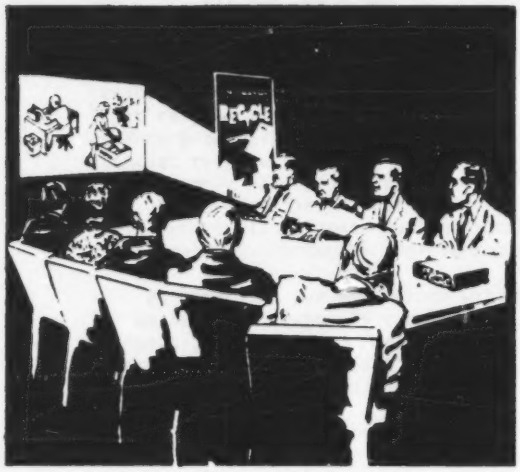
The development of the storage system is the most critical step in developing the internal collection system for a specific building, since the way in which paper is stored will determine how it is collected. The program coordinator can play a major role working with the building manager and sales contractor in developing this system.

CONDUCTING THE EMPLOYEE PUBLICITY & EDUCATION CAMPAIGN

The success of a source-separation program depends upon employee awareness, cooperation, and concern. None of these is possible without a vigorous education campaign to explain to the employees the goals and methods of the program. Such a campaign should begin well in advance of the institution of the program, but not so far in advance that employee enthusiasm diminishes before the program is implemented.

Major elements involved in motivating employee participation include:

- Drafting and distributing a "kick-off memo" from the top administrator of each organization to all personnel. The memo should express management's support of the program.
- Scheduling the education sessions for management, program monitors, maintenance staff, and staff employees.
- Distributing education session schedules.
- Procuring and/or developing slide shows, posters and other publicity materials.
- Conducting education sessions. This marks the actual implementation of the program.



Management education system.

Full-service contractors provide assistance and materials for scheduling and conducting education sessions and the publicity campaign. In most cases, they provide slide shows and other visual presentations, as well as technical assistance and materials for other aspects of the publicity campaign.

In a situation where the organization does not have a full-service contract, the organization must procure the necessary publicity materials and perform each activity using in-house personnel.

Drafting the Program "Kick-Off" Memo. It is crucial to officially endorse the implementation of the program by distributing a "kick-off memo" from a top-level administrator of the office facility. The distribution of this memo initiates the sequence of activities discussed below and in the previous chapter. An example of a recommended memo is displayed on page 23. The following key points should be noted from this sample memo and should be stressed in memos developed from it.

- Implementation of the paper recovery program constitutes an official organization effort to reduce waste.
- The program is endorsed by top-level management;
- Significant revenues will flow back to the organization from paper sales and waste disal costs will be reduced;
- The operation of the program is simple, requiring only a small change in personal habits;
- The paper that will be separated and recovered through this program is a high value material that is easily source separated and represents a major portion of the waste stream from this building;
- Everyone is required to attend a short, fifteen-minute briefing explaining program operation and what is expected of each employee;
- A schedule of the employee education sessions should be attached.

Scheduling the Education Sessions. The initial employee education sessions are the most crucial aspect of implementing a paper separation program since large numbers of personnel are involved. These sessions must be properly organized and scheduled in order to be as convenient as possible for all employees. They should immediately follow the distribution of the kick-off memo in order to maintain employee awareness through the program implementation phase.

Larger organizations benefit by holding sessions for different levels of management and personnel participating with the program. A suggested sequence for presenting information is:

- Management
- Program monitors
- Maintenance staff
- Employee staff level

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

THE ADMINISTRATOR

SUBJECT: PAPER RECYCLING AT WATERSIDE MALL

FROM: Russell E. Train

TO: All EPA Employees

Our Agency will soon initiate at Waterside Mall the first federal paper recycling program in the Washington, D.C. area. The object of this program is to recycle all the high-grade white and off-white wastepaper we generate at Waterside Mall. As you may know, EPA has proposed that all federal agencies recycle their high-grade wastepaper. We hope our program will serve as an example for these agencies. As we approach the Agency's fifth anniversary, it is significant that this program presents a rare opportunity for every individual to contribute personally and tangibly to a collectively significant environmental improvement effort.

By recycling our high-grade wastepaper, we can recover over half of all the waste that leaves EPA's buildings. A contract recently signed for sale of our paper will bring revenues of approximately $50 per ton to the U.S. Treasury. This is in addition to the facts that recycling conserves energy and natural resources and protects our land from overburdens of waste.

The recycling program at Waterside Mall will be simple; only small changes in our daily habits are required. Each employee will have a desk-top container into which he or she will place white and off-white wastepaper. When the container is filled, about once a week, the employee will empty the accumulated paper into a designated box at conveniently located recycling stations on each floor. These stations will be clearly marked with our USE IT AGAIN, SAM slogan and will be located at a place which each employee frequents in the course of his or her normal business day.

A series of slide shows will be given to acquaint each employee with the program. A schedule of these will be distributed within the next two weeks. I urge each of you to attend. In addition to the slide shows, the Office of Solid Waste Management Programs will provide assistance as required.

Within the next week, program coordinators from that office will identify convenient recycling station locations and answer questions.

The success of this program depends upon everyone's cooperation.

The program "kick-off" memo used at EPA headquarters to introduce the soon to be implemented paper recovery program.

Some of these levels can be combined into one session depending upon the size of the organization. Sessions for top-level management should be held prior to distribution of the "kick-off memo" to all employees. Subordinate employees must be required by top-level management to attend scheduled education sessions. Approximately 75 percent of the employees can be expected to attend these sessions if required by their supervisors to do so.

Briefing employees who are unable to attend education sessions should also be considered. Followup briefings should be minimized, however, by making initial sessions as convenient as possible for employees to attend.

Scheduling large numbers of personnel sessions can be done in a number of ways depending upon the availability of large and conveniently-located auditorium space. Obviously, fewer education sessions are required for facilities where larger, main auditoriums are used. However, participation levels will be limited because of the tendency to empty offices of personnel, particularly if employees are scheduled to attend by office department.

A more practical approach, particularly when auditorium space is limited, is to schedule smaller sessions of approximately 100-200 people using the first letter of employee surnames. This phased approach will minimize the tendency to empty any one office since the audience will be drawn from throughout the organization. This approach is practical only if sufficient personnel are available to hold a large number of sessions and if employee attendance can be scheduled by using organizational charts or a company phone book listing surnames alphabetically. In situations where central auditorium space is unavailable, slide shows can be presented floor by floor or by office location.

Schedules should be flexible to allow employees a choice of two or more sessions to attend. It is recommended that sessions be scheduled between the hours of 9:00 and 11:30 am and 2:00 and 3:30 pm, and not around lunch breaks or the beginning or end of the day. In addition, sessions should not be held around holiday or vacation periods when a large number of employees tend to take leave.

Distribution of Education Sessions Schedules. Session schedules can be distributed as part of the "kick-off memo" package, and may include a map describing the location of the auditorium where the sessions will be held. A certain lead time must be allowed between distribution of the schedule to employees and the education sessions. This lead time should be no longer than one or two weeks so that employees maintain session attendance as a high priority on their daily schedules.

Procuring or Developing Posters, News Articles, and Other Publicity Materials. A comprehensive publicity program must immediately follow both the distribution of the "kick-off memo" to all employees and the employee education sessions. Publicity should stress:

- How the program works;
- What paper is acceptable and what isn't;
- How the company or agency will save through revenue and decreased disposal costs;
- What environmental and conservation benefits are obtained from recycling;
- Where the central containers are placed.

Slogans, name identifications, and graphics have played an important role in source separation program publicity campaigns studied by EPA. The slogan "Use It Again, Sam" developed by EPA for federal government paper recycling programs easily identifies all items associated with the recovery system. Through the use of appropriate slogans and graphics, participants in a paper recovery program can be continuously reminded of its existence and what is expected of them.

HEADQUARTERS

EPAgram

U.S. ENVIRONMENTAL PROTECTION AGENCY

SPECIAL SPECIAL SPECIAL

USE IT AGAIN SAM

A Federal Government Paper Recycling Program

To insure successful implementation of EPA's USE IT AGAIN SAM program, three series of meetings have been scheduled: one series is for all EPA employees, another is for those people who will be chosen to be program monitors, and one is for Division Directors and Branch Chiefs.

1. Division Directors and Branch Chiefs will meet first.

   Monday, November 10th

   10:00 A.M. Room 2117
   11:00 A.M. Room 2117

2. Next, program monitors, who will have been selected by their appropriate Division Directors or Branch Chiefs, will meet:

   Thursday, November 13th

   10:00 A.M. Room 2117
   2:00 P.M. Room 2117

   Friday, November 14th

   10:00 A.M. Room 2117
   2:00 P.M. Room 2117

3. The last series of meetings, those for all EPA staff, is actually the beginning of the program's operation. At these meetings, EPA employees will get their Sesa-Cop containers.

   If you happen to miss the meeting you were scheduled for, please attend any of the other meetings.

   Tuesday, November 18th, Room 2117
   All employees whose last names begin with the letter:

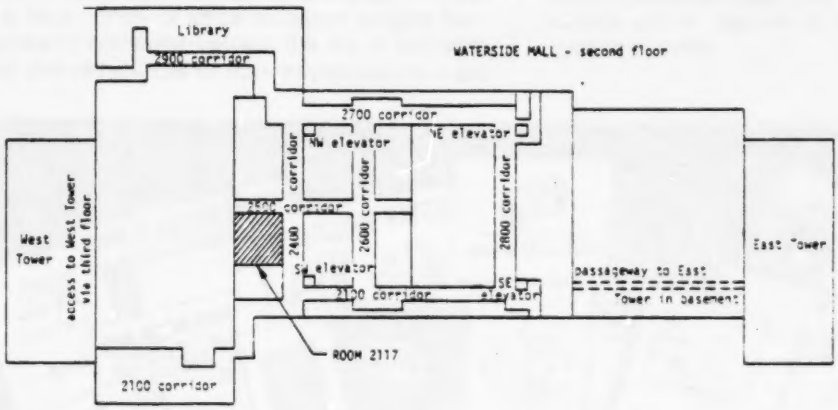
A-D	E-H
9:00 A.M.	2:00 P.M.
9:30 A.M.	2:30 P.M.
10:00 A.M.	3:00 P.M.

   Thursday, November 20th, Room 2117

I-L	M-P
9:00 A.M.	2:00 P.M.
9:30 A.M.	2:30 P.M.
10:00 A.M.	3:00 P.M.

   Friday, November 21st, Room 2117

S-Z
9:00 A.M.
9:30 A.M.
10:00 A.M.



The education session schedule and map distributed to EPA headquarters employees.

Examples of slogans used by other source separation programs are:

- "Tree Saver"
- "Somerville Saves"
- "Recycle Plus"

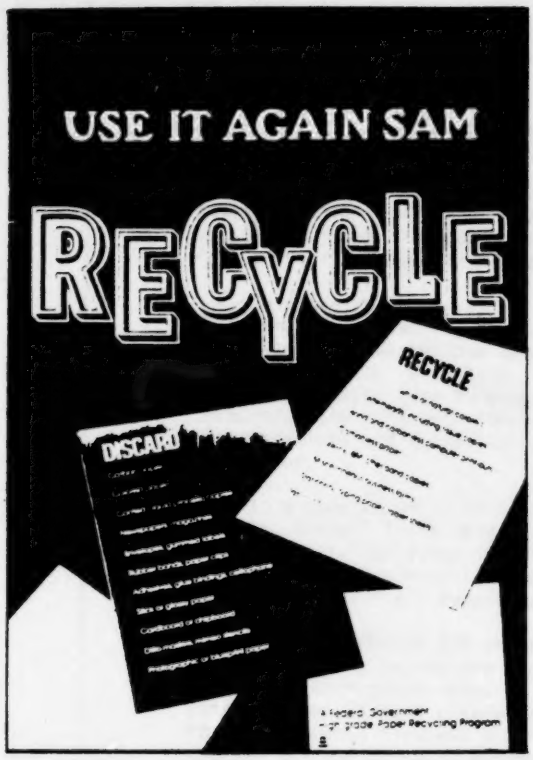
Various methods for presenting these issues to office personnel include:

- Posters
- News articles and newsletters
- Brochures, leaflets, memos, etc.

Posters designating recyclable and non-recyclable materials are used to mark central container locations. These posters must be acceptable for use in a wide variety of office locations ranging from lobbies to computer centers. The lists of materials that are recyclable or non-recyclable must be clear and convenient for employees to read as they deposit paper in the central containers.

Employee newsletter articles, brochures, and various types of memos and notices are also used in publicity campaigns. These materials convey information within the organization on problem areas which develop procedural changes, reminders of paper preparation requirements and contaminants, and program performance. Periodic notices and reminders, using internal newsletters or other communication documents, should be distributed on a scheduled basis or as required after the program is implemented to discuss program problems and accomplishments. Articles submitted to local newspapers are also helpful in generating outside citizen support for the organization's recycling activities.

Many publications are available for use in paper recovery program publicity campaigns.



The slogan and poster developed by EPA for office paper recovery programs.

The "Use It Again, Sam" poster is available through the Government Printing Office. Other information on office paper recycling is available from EPA, paper industry groups (such as the American Paper Institute), and various state agencies and private organizations involved with paper recycling.

CONDUCTING THE SESSIONS

Sessions should be no longer than 15 to 20 minutes. Ten minutes should be allocated for a formal presentation, including a narrated slide presentation, and 5 to 10 minutes for questions and answers. The formal presentation should include a concise description of program operation with pictures of all equipment and material bins to be used, collection techniques, and specification of acceptable and non-acceptable paper. In addition, a display of desk-top containers, central collection containers, posters, and acceptable and non-acceptable materials for recycling should be set up for further clarification.

Many organizations place desk-top containers on seats prior to education session or distribute them at the end. A short list of instructions delineating the type of acceptable paper, the location of central collection containers, and a phone number to call for answering questions on program operation also can be placed in the containers.

Slide shows are the most effective tool for presenting information on program operation to large audiences. They are essential in implementing programs in large organizations.

For organizations not under a full service contract, a slide show and narrative, developed by EPA, will be available from the National Audio Visual Center, General Services Administration, Washington, D.C. This show is designed to educate office employees about the program operation, equipment used for collection and contaminants.

The type of audience determines the emphasis of each session. For instance, in presentations made to the maintenance staff, program operation, contaminants, location of central containers, and type of containers being used must be stressed in order to avoid confusion with the mixed waste system. This clarifies what equipment and containers are to be used in the program. It is especially important that detailed instructions be given to maintenance staffs who work after business hours and are therefore unable to attend the regular education sessions. Many office paper recovery programs have been frustrated by janitors who mistakenly throw away carefully saved high-grade wastepaper.

Progam operation techniques, contaminants, and central collection container locations should be emphasized to all general staff employees. Program performance, environmental impacts, and economic statistics should be emphasized to management.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

PRESS RELEASE

EPA Introduces Wastepaper Recovery at its
Washington Headquarters

During the week of November 17, U.S. Environmental Protection Agency employees at the Washington Headquarters will be introduced to the Agency's USE IT AGAIN SAM wastepaper recycling program. The program is expected to recover over one ton per day of high-grade wastepaper for recycling.

To acquaint employees with the program, each employee will attend a slide show and receive a personal desk-top container to separate and accumulate recyclable wastepaper (white ledger, computer print-out, tab cards) from other waste. When this container is filled, the employee will empty the accumulated paper into a receptacle at conveniently located recycling stations throughout the offices. The recovered paper will be collected daily from these stations and stored temporarily pending weekly pickup by a government contractor.

In a memorandum to all EPA Headquarters employees to announce the program, Russell Train said, "It is significant that this program presents an opportunity for every individual to contribute personally to a collectively significant environmental improvement effort. We hope our program will serve as an example for all federal agencies."

The USE IT AGAIN SAM program is simple; only slight changes in the employees' daily habits are required. The fact that the recovered paper is a valuable high-grade resource facilitates the search for markets and the establishment of term contracts for its sale. In addition, the reduction in the office waste flow and the revenues from the program will result in an overall savings to the government.

An EPA press release to newspapers immediately before program implementation.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

USE IT AGAIN, SAM

THE ADMINISTRATOR

GOOD NEWS

Over a period of 40 working days, EPA Headquarters has recovered 63,530 pounds (or 31.8 tons) of high-grade paper through its USE IT AGAIN, SAM program. At the present price of $55 a ton, this means that the government will receive $1,750 for our successful recycling efforts.

During December, we were recovering 1,300 pounds per day. This is understandably low because December is a popular month for annual leave. During January, we recovered 1,700 pounds per day, a significant increase over December's figure. And we expect to report equally significant increases in the future.

According to a survey done in August, 1975, of Headquarters waste, 1,700 pounds is about half of all the solid waste we generate daily. In a few weeks, we will conduct another such survey to determine the amount of recyclables that remain in the waste stream and to check the accuracy of the August survey.

For economic reasons, paper pick-up has been changed from a daily service to an every-other-day service. This change seems to be working out well. If there are any problems with it (as there might be in areas of high generation), please bring them to the attention of the program coordinators at 755-9140 and they'll be solved.

It is exciting to see that we can practice what we preach.
KEEP UP THE GOOD WORK!

An article which appeared in an EPA employee newsletter 3 months after program implementation regarding program performance and certain procedural changes.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

USE IT AGAIN SAM

The following types of paper are recyclable under EPA's USE IT AGAIN SAM program:

- white or natural-colored paper -

- Letterhead, including the white tissue copy once the carbon paper has been removed.
- Bond and carbonless computer print-outs.
- Carbonless paper and miscellaneous business forms.
- Stationery, typing paper, tablet sheets.
- Xerox, IBM, and other bond copies, but not coated (liquid process) copies.
- Tab cards.

Many reports are acceptable once the colored or slick cover and/or glue binding has been removed.
(The natural-colored paper used in copying rooms is acceptable. It is 100 percent recycled paper. The off-white color is a result of minimum bleaching, thus helping reduce water pollution and production cost.)

The following items are not recyclable under EPA's USE IT AGAIN SAM program:

- Envelopes, both white and manila.
- Carbon paper.
- Colored paper - this includes the yellow and pink message pads and the yellow legal pads.
- Newspapers and Magazines - this includes the Federal Register.
- Coated copy paper.
- Gummed labels, rubber bands, paper clips - staples are okay.
- Adhesives, glue bindings, cellophane.
- Slick or glossy paper.
- Cardboard or chipboard.
- Photographic or blueprint paper.

A memo placed in the desk-top container during implementation of the paper recovery program.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

USE IT AGAIN SA

Proposed Recycling Stations

As a result of a survey of EPA Headquarters, the following locations have been proposed as recycling stations:

WEST TOWER		EAST TOWER	
Floor	Proposed Recycling Stations	Floor	Proposed Recycling Stations
2	221, 227	Basement	B15, B26, B49, B55
3	313, 323, 329	1	107, 108, 124-138
4	401, 413, 438	2	201, 207-221, 206, 230-244
5	511, 515, 532, 541	3	313, 317, 340, 347
6	601-605, 611-613, 627, 634	4	400, 417, 445, 449
7	701, 711-713, 735, 738	5	515, 538, 541
8	801, 811-813, 825-827, 835-837	6	606, 613, 631
9	905, 911-913, 927, 942	7	713, 735, 740
10	1005, 1011-1013, 1035-1037, 1038	8	810, 813, 835, 837, 842
11	1110, 1131, 1136	9	901, 910, 913, 935
12	1206, 1223	10	1010, 1011, 1037, 1042
		11	1113-1115, 1119, 1133, 1145
		12	1208, 1213, 1219

It is hoped that these recycling stations will be relocated if a more convenient location can be found.

Each station is intended to serve approximately twenty people. Thus, as a rule, no station ought to serve less than ten people or more than thirty-five people.

In order to facilitate daily pick-up of the wastepaper, the recycling stations should be next to or near a door leading into the public hallway. (There will be recycling stations in all the data centers.)

Questions about the program and recycling stations should be addressed to the program coordinators at 755-9140.

A list of recycling station locations placed in the desk-top container during implementation of the paper recovery program.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

THE ADMINISTRATOR

MEMORANDUM

SUBJECT: The "Use It Again, Sam" Recycling Program

TO: EPA Headquarters' Staff

HAPPY BIRTHDAY: CONGRATULATIONS, EPA!

November 19, 1976, marked the first anniversary of the "Use It Again, Sam" Recycling Program, here at Waterside Mall, and we can celebrate it with pride. In the past year, we have recycled over 285,600 pounds of our high-grade office wastepaper and have reduced our total waste going to disposal by about 40 percent. The program has earned over $8,000 in revenue.

We would like to thank all of you for your participation in the program. We hope that you will continue in your efforts to make this program a success. We each recycle a half-pound of wastepaper per day, so each employee has a significant impact on the program.

As a reminder, the following items are acceptable under the program:

1. all high-grade white and buff colored ledger paper
2. bond computer print-out
3. computer tab cards
   (Note: Staples are acceptable)

Unacceptable items include:

1. carbon and all colored papers (including telephone message forms)
2. newspapers and magazines (e.g., Federal Register)
3. all envelopes, adhesives and manuals with glued bindings
4. slick, glossy or coated (liquid process) paper
5. cardboard or cellophane
6. rubber bands and paper clips
   (Note: Self-adhesive correction tape and plastic bindings are not acceptable and must be removed before the paper can be recycled.)

Special thanks must be given to the Shipping and Receiving Branch, and in particular to Mr. Bill Ridgely who currently supervises the program. Also to be thanked are the staff of Edwards Trucking -- Mr. Donald Bruce and Mr. John Summers, who so conscientiously have collected that paper from the recycling stations.

If you need a special pick-up or a desk-top container, please contact Mr. Ridgely at 59032. If you have questions about the program or desire more information, please contact Liz Tennant of the Office of Solid Waste at 59140.

A memo distributed to EPA headquarters employees marking the first year of the paper recycling program operation again stressing contaminants and operational procedures

The undesirability of contaminants such as colored paper, newspaper, etc., must be heavily stressed throughout the entire organization, in all education sessions and written materials. No single factor can contribute more to the failure of a paper recovery program than an excessive level of contaminants.

The high-grade paper recycling process involves bleaching and hydropulping the recovered paper into a slurry. Paper sheets are then formed from this slurry on a continuous moving screen and subsequently drawn through rollers for drying. This process requires the use of expensive machinery. It is very sensitive to any of these contaminants commonly found in office waste for the reasons explained.

Equally important to stress is the acceptability of white or natural-colored paper products. Natural-colored paper, available from many paper companies, is acceptable in high-grade paper recovery programs. It is 100 percent recycled paper and has an off-white color because of minimum bleaching, thus helping reduce water pollution.

- Letterhead, including the white tissue copy.
- Bond and carbonless computer print-outs.
- Carbonless paper.
- Plain bond copy paper that is not coated.
- Miscellaneous business forms.
- Stationery, typing paper, tablet sheets.
- Tab cards.

Many reports have unacceptable covers and bindings. If the contents are acceptable for recycling, the cover and binding can be removed.

REINFORCING THE NEWLY DEVELOPED RECYCLING HABIT

Once implemented, office paper recovery programs require continuous administration on the part of building management and the program coordinator, and the cooperation of all employees. A special effort must be made to avoid confusion by effectively operating the program by occasionally reminding employees about which papers are acceptable and non-acceptable for recycling. This is particularly important during the first few months of program operation. Most organizations find that employees develop the recycling habit within one week after program implementation. However, this habit can be sustained only if:

- There is no excess accumulation of paper at central container locations.
- The central container locations are kept neat and orderly.
- Employees are provided with a central phone number where they can report trouble such as collection delays and can inquire about the acceptability of various types of paper. An instantaneous response to all problems and questions is critical for maintaining employee participation.
- An ongoing publicity campaign providing feedback to employees on program performance and general problem areas is performed.

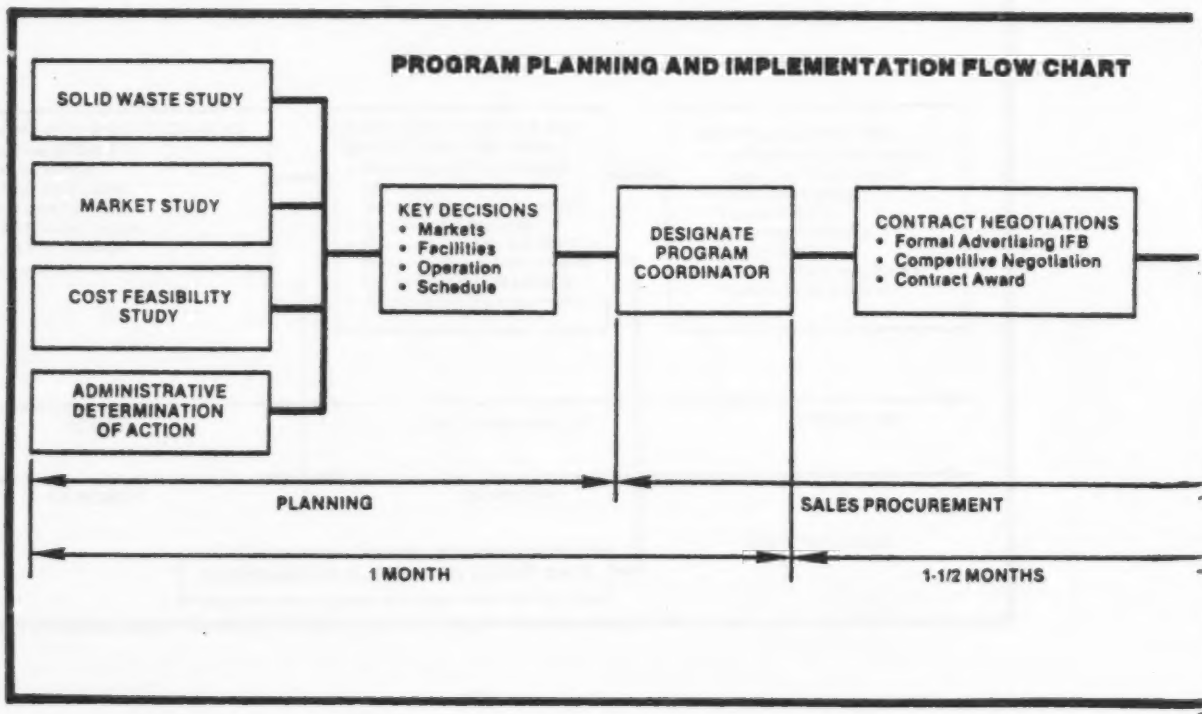
Excess accumulation of paper at some central container locations may occur initially due to extra paper which previously was accumulated by employees and unavoidable collection system start-up difficulties. Collection delays must be identified and resolved as quickly as possible. Widespread employee participation and high rates of paper recovery are not possible without the prompt development of a smooth and efficient collection system.

The collection system also must be closely supervised and monitored after the operation of the program has stabilized. It may be necessary to change the locations of certain central containers or the frequency of collection at certain locations because of abnormally high- or low-generation rates. Program operating experience usually leads to other modifications for increased operating efficiency. Collection personnel should be encouraged to provide recommendations for any modifications to increase program operating efficiency.

The ongoing publicity and education aspects of the program cannot be over-emphasized. There must be immediate reinforcement of the changing habits required for recycling. It must be clear that the program is permanent and that it will work only through the cooperation of all participants. This may include monthly notices of tonnages that have been recovered, any contamination problems, and revenues that have been received from the sale of the paper. A system that is sustained through a continuing employee education program and a proper management program will attain a growing rate of participation, while placing few demands on employees.

Other ongoing administrative activities include monitoring the recovery rates and scheduling the pickups. A record-keeping system should be developed which includes the tabulation of recovery rates, all program operation costs, and the revenues from the sale of the paper. This data can be used for drafting reports on the program and can serve as a basis for ongoing publicity programs providing feedback to employees.

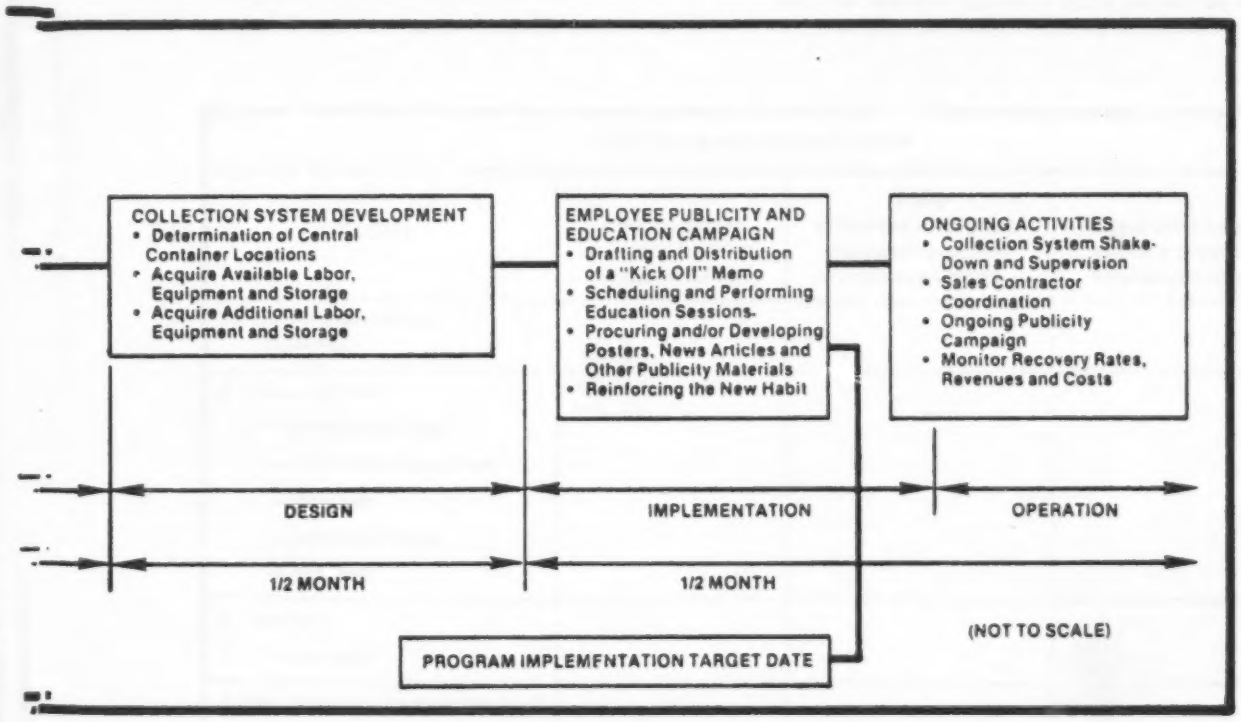
The scheduling of paper pickups should be coordinated between the sales contractor and the



facility's receiving and shipping personnel in order to facilitate the preparation of paper for shipment and to ensure that the necessary paperwork has been completed. These activities may include weighing the trucks, both prior to and subsequent to loading, and filling out all necessary shipping documents and weight slips. Weight slips can then be used for estimating recovery rates and revenues in order to evaluate program performance.

Another method of increasing revenues and reducing the potential for employee confusion is to increase the percentage of the waste flow tonnage that is recyclable. This can be accomplished by reviewing traditional procurement practices that may require the use of colored paper or coated paper that is not recyclable through a high-grade paper recovery program. Many opportunities exist for increasing the use of recyclable white or uncoated paper in these situations. For instance, when color coding is needed, multi-leaf white paper forms with a color strip may be available for this same purpose. This paper would be recyclable in a high-grade program whereas the previously-used solid color paper would not be. Recyclable white or natural-colored paper can substitute for non-recyclable colored or coated paper used for many other purposes, such as organization newsletters and bulletins, with little effect on their ease of identification.

The flow chart below presents the major implementation activities that have been discussed in the previous chapter, the sequence of occurrence, and estimated time requirements for a representative building of 1,800 people.


COLLECTION SYSTEM DEVELOPMENT
• Determination of Central Container Locations
• Acquire Available Labor, Equipment and Storage
• Acquire Additional Labor, Equipment and Storage
EMPLOYEE PUBLICITY AND EDUCATION CAMPAIGN
• Drafting and Distribution of a "Kick Off" Memo
• Scheduling and Performing Education Sessions.
• Procuring and/or Developing Posters, News Articles and Other Publicity Materials
• Reinforcing the New Habit
ONGOING ACTIVITIES
• Collection System Shake-Down and Supervision
• Sales Contractor Coordination
• Ongoing Publicity Campaign
• Monitor Recovery Rates, Revenues and Costs
DESIGN
IMPLEMENTATION
OPERATION
1/2 MONTH
1/2 MONTH
(NOT TO SCALE)
PROGRAM IMPLEMENTATION TARGET DATE

PROJECTING THE ECONOMICS OF PAPER RECOVERY

This chapter is a guide for organizations which wish to develop cost estimates to determine the economic feasibility of implementing a high-grade paper recovery program. Estimating costs to determine economic feasibility is most easily performed using a standardized analysis format that compares present solid waste management expenses to projected expenses after implementation of a paper recovery program. EPA has identified basic cost factors associated with the collection, storage and disposal of office waste which can be used to project the economics of implementing a paper recovery program. These are presented in a sample analysis format below and are discussed in separate sections in this chapter. Each section presents information necessary to complete the analysis and to calculate potential solid waste management savings after implementing a paper recovery program.

You will note that the form is divided into three columns. Each cost factor will be analyzed both prior to and after implementation of a paper recovery program as discussed below.

Solid Waste Management Costs Prior to Paper Recovery Program Implementation. When possible, it is best to use the office's expense records to determine present solid waste management costs prior to implementation of a paper recovery program (first column). In many organizations, much of this information is available, but it may be in an unsuitable form or be otherwise inadequate for completing this analysis. EPA has developed the solid waste cost data presented in this chapter to facilitate the completion of this analysis in situations when the necessary information is not readily available. These data are averages for every 100 employees housed within EPA case study sites. Any organization can use this data by simply multiplying the relevant figures in each section by every 100 employees housed within their facility.

Solid Waste Management Costs			
Factors	**Prior to paper recovery program implementation**	**Fully allocated after paper recovery program implementation**	**Actual after paper recovery program implementation**
1. Waste Generation (ton/mo.)			
2. Costs ($/mo.) — collection labor — collection equipment — storage — administration — disposal			
3. Savings — revenue			
4. Net solid waste management costs			
5. Potential savings			

Solid Waste Management Costs After Paper Recovery Program Implementation. Two approaches are used to estimate solid waste management costs after implementation of a paper recovery program. This is necessary since the many methods used to implement programs may result in wide variations in actual costs from building to building.

- Fully Allocated Costs:

  Fully allocated costs after implementation of a paper recovery program are projected costs based on the theoretical requirements for labor, equipment and space (second column). For example, EPA data indicates that, on the average, seven man-hours per 100 employees per month are required to collect recovered paper. At a labor rate of $5 per hour, collection costs would be $35 per month for 100 employees. Under the fully allocated column, the projected labor costs for two separate organizations housing an equal number of employees would be identical, as the theoretical man-hour requirements for eac#100 employees are the same.

- Actual Costs:

  Actual costs are estimates of actual budgetary changes that may be expected based on average costs actually incurred at EPA case study locations (third column). EPA found that in many situations, the costs of handling recovered paper were absorbed by or internalized within the existing solid waste management budget. An example of this would be an organization that implemented a paper recovery program and experienced no change in mixed waste handling costs or incremental costs for collection of recovered paper.

To demonstrate how to complete this four-column form, a sample analysis is performed for the Jefferson Building, a fictitious, representative office building of 1,800 employees that could be located anywhere in the United States. Waste generation rates are determined first, followed by costs, revenues and where applicable, savings for solid waste management activities both prior to and after implementation of a paper recovery program.

Data presented in each section of this chapter is based on the case studies in the EPA report entitled Optimization of Office Paper Recovery Systems.[1]

[1]*SCS Engineers, Optimization of Office Paper Recovery Systems. U.S. Environmental Protection Agency. May, 1976. Distributed by National Technical Information Service, Springfield, VA.*

GENERATION RATES OF MIXED WASTE AND HIGH-GRADE PAPER

Historical tonnages of waste disposed of from an office building can be determined by reviewing any existing solid waste disposal records or obtaining information directly from the waste hauler servicing the building. In the absence of this data, an organization may wish to carry out a quantity and composition study (Appendix C) or may use the average generation factors discussed below.

General purpose office facilities surveyed by EPA generated an average of 1.5 lbs. of mixed waste per employee per day (see page 2).*

Similarly, the desk-top paper recovery programs implemented at these facilities recovered from 60 to 70 percent of the high-grade paper in the waste stream, or an average of 0.5 lbs. per employee per day. Thus the Jefferson Building would generate 2,700 lbs. of mixed waste daily (1.5 lbs. per employee per day times 1,800 employees) and would recover 900 lbs. per working day or 9.9 tons per month of high-grade paper (0.5 lbs. per employee per working day times 1,800 employees).

COLLECTION LABOR REQUIREMENTS

Mixed Waste. The average time required for the collection of mixed waste prior to and after the implementation of source separation programs at EPA case study sites is summarized below in terms of the total amount of custodial time spent per 100 employees per month.

	Average Mixed Waste Collection Time Custodian (hrs./100 employees/mo.)
Prior to source separation	44
After source separation	39

These data indicate that the handling requirements for mixed waste are reduced by 12.5 percent, or 5 hours per 100 employees per month, after the implementation of a paper recovery program. This is the result of fewer trips made to central waste collection or storage areas by custodians due to the diversion of a significant portion of the

**Bank and insurance type facilities generate significantly larger amounts of waste, averaging 2.3 lbs. per employee per day.*

waste stream for recycling. In many facilities, mixed wastebaskets may not need daily servicing, especially after a large amount of high-grade wastepaper is diverted from the mixed waste stream. When combined with a well-run source separation program, an efficient waste-handling system can use this freed labor time to collect the recovered paper.

In some situations, however, full advantage cannot be taken of reduced waste handling requirements. For example, if employees are permitted to eat in their offices, the presence of food wastes may require the daily servicing of wastebaskets. In other situations, custodians may make only one trip per shift to a central storage area, particularly if they have other maintenance duties in a specific area of the building. After a paper recovery program has been implemented, they will continue to make single trip, simply handling less waste.

Recovered Paper. Like mixed waste, source separated paper must be collected on a regularly scheduled basis. According to EPA studies, the time required for the collection of separated paper ranges from 6 to 8 hours per 100 employees per month, regardless of building size. The average time requirement for all case study sites was 7 hours per 100 employees per month.

In many programs, the time requirement for the collection of recovered paper was met using existing labor resources at no increase in cost. These programs took advantage of either slack time available within the facility's maintenance staff or of custodial time by the reduced handling requirements for mixed waste.

Estimating Collection Requirements. The time required to collect mixed waste and the recovered high-grade wastepaper in the Jefferson Building can be determined as follows:

- Mixed waste before paper recovery: 44 hrs./100 employees/month x 1,800 employees = 792 custodial hrs./month.
- Mixed waste after paper recovery: 39 hrs./100 employees/month x 1,800 employees = 702 custodial hrs./month.
- Recovered high-grade waste paper: 7 hrs./100 employees/month x 1,800 employees = 126 custodial hrs./month.

Total collection time after implementation of a high-grade paper recovery program: 702 hrs./month (mixed waste) + 126 hrs./month (recovered paper) = 828 hrs./month.

Calculating Collection Costs. If a rate of $5 per hour is assumed, monthly collection costs prior to and after implementation of the paper recovery program at the Jefferson Building can be computed as follows:

- Before paper recovery (first column):

  Mixed waste: 792 custodial hours/month x $5/hour = $3,960/month.

- Fully allocated after paper recovery (second column):

  Mixed waste: 702 custodial hours/month x $5/hour = $3,510/month.

  Recovered paper: 126 custodial hours/month x $5/hour = $630/month.

- Total fully allocated collection costs for mixed waste and recovered paper (second column):

  $3,510 + $630 = $4,140/month.

- Total actual collection costs for mixed waste and recovered paper (third column):

  If there will be no incremental change in total solid waste collection costs (for mixed waste and recovered paper) after implementation of the paper recovery program, no effect on collection activities can be accounted for in estimating costs. Total monthly costs will remain at $3,960 per month.

Storage	Before paper recovery	Fully allocated costs after paper recovery	Actual costs after paper recovery
Collection Labor @ $5/hr			
- mixed waste	$3,960	$3,510	$3,960
- recovered paper		630	
Total Collection Labor	$3,960	$4,140	$3,960

COLLECTION EQUIPMENT

Mixed Waste. A wide variety of equipment is used to collect mixed waste in office buildings. This equipment includes items such as wastebaskets, barrels and gurneys, dollies, racks and hand-carts. To estimate monthly or yearly costs for equipment of this type, original costs are typically amortized on a straight-line basis for a period of five years (60 months) or longer, depending upon the anticipated useful life of the equipment.

Total original equipment costs averaged $600 per 100 employees at buildings studied by EPA.

Based on 5-year amortization, monthly costs for mixed waste handling equipment such as wastebaskets, custodial carts, plastic bags, etc., averaged $10 per 100 employees per month. Thus, the Jefferson Building would incur monthly equipment costs of $180 prior to source separation ($10/100 employees/month x 1,800 employees = $180/month).

Recovered Paper. Equipment costs for implementing a source separation program vary, depending upon the collection technique, sales contract type, (see page 9) and the degree to which paper collection equipment requirements are met using existing resources. One desk-top container is required for each desk employee and one central container is needed for every 20 to 25 employees.

Modifications of existing equipment or the purchase of an additional handcart may be necessary for collection of recovered paper. If all equipment is purchased at the time of implementation in the Jefferson Buiding the fully allocated cost would be calculated as follows, based on a five year straight-line amortization:

- Desk top containers (1 per employee):

  1,800 containers x $1/container ÷ 60 months = $30/month.

- Central collection containers (1 per 20 employees):

  90 containers x $2/container ÷ 60 months = $3/month.

- Handcart (1 for the building):

  1 truck x $180/truck ÷ 60 months = $3/month.

Thus, total monthly equipment costs for the paper recovery program would be $36 per month. Since the desk-top containers, central containers, and handcart are in fact additions to the Jefferson Building's existing collection equipment inventory, the fully allocated and actual costs are identical. The equipment costs for mixed waste remain the same.

Under a full service contract, desk-top containers and central containers may be provided by the sales contractor at no direct charge to the organization implementing the program. However, the Jefferson Building would probably still need to purchase an additional handcart for collection of recovered paper. Thus, under a full service contract, the incremental cost at the Jefferson Building would be only $3 per month for the purchase of the handcart. In this case, the actual cost of collection equipment would only increase to $183 per month ($180 + $3/month).

Administration	Prior to paper recovery	Fully allocated costs after paper recovery	Incremental after paper recovery
Collection Equipment			
- mixed waste $0.10/ employee/ month	$180	$180	$180
- recovered paper:			
• desk-top containers @ 1/ employee		30	30
• central collection containers @ 1/20 employees		3	3
• hand truck @ 1/ 1,800 employees		3	3
Total Collection Equipment	$180	$216	$216

STORAGE REQUIREMENTS

Containers for Mixed Waste. Common methods for accumulating general office wastes are loose storage in trash rooms, storage in bulk or roll-off containers, and densified storage in stationary compactors. In most situations, storage equipment (such as bulk containers and compactors) are provided by the waste hauling contractors as part of their disposal service.

Office buildings can estimate expenses for the storage containers they own by amortizing the original costs over an estimated life span. Most office buildings, however, have no direct storage equipment costs for mixed waste.

Storage Containers for Recovered Paper. Recovered paper is most often stored in pallet-size boxes, canvas bags, or bulk containers. These are provided by the paper purchaser in most cases. Balers, however, are generally owned by the office building unless special contract arrangements are made. Unless paper generation rates are high enough, baling may not be economically feasible because of the associated capital and operating costs (see page 19).

Handling Equipment. If recovered paper is packaged in a palletized or baled form, a forklift or pallet jack must be available for handling it and loading it onto the contractor's trucks. In most cases, a portion of the capital cost and operating expenses of an existing piece of handling equipment are allocated for handling packaged paper. Based on EPA case studies, the fully allocated cost of a forklift used to handle recovered paper is estimated to be $30 per month for the Jefferson Building.

Storage Space. The actual square footage of space needed to store both mixed waste and recovered paper varied considerably among facilities studied by EPA. This is due to differences in collection frequency and storage technique, which range from non-compacting multiple containers of 1.5 cu. yd. to large 40 cu. yd. stationary compactors.

As a result of this diversity, it was not possible to develop meaningful storage space estimates from the case studies. It is recommended, therefore, that individual organizations either measure or estimate the amount of space presently used for storage of their mixed waste. This may involve measuring the space required for a stationary compactor or multiplying the number of small bulk containers used by the container base area. Estimates of the amount of storage space required at the Jefferson Building are based on storage techniques and collection frequencies felt to be representative for a building of its size.

Mixed waste before paper recovery. High-rise office buildings similar to the Jefferson building commonly use a stationary compactor with a volume of 30 cu. yds. requiring approximately 160 sq. ft. of space. At a cost of $0.30 per sq. ft. per month, the cost of storage space for mixed waste would be $48 per month at the Jefferson Building (160 sq. ft. x $0.30/sq. ft./mo.).

Mixed waste after paper recovery: Generally, mixed waste storage space is not reduced after paper recovery at buildings using stationary compactors. However, the collection frequency or number of "pulls" per week may be reduced due to decreased waste tonnages. This may result in disposal cost reductions which are discussed in more detail in the subsequent section on disposal costs.

Office buildings using a multiple container mixed waste storage system may be able to reduce the number of containers and consequently storage space requirements. One office complex studied by EPA was able to reduce the number of mixed waste containers (in this case 1.5 cu. yd. containers) from 22 to 16 after implementation of a paper recovery program. At the Jefferson Building, however, mixed waste storage space will not be reduced after paper recovery program implementation due to the use of a stationary compactor system.

Recovered paper: The contract through which the paper is sold will usually contain certain provisions which determine the amount of storage space needed. For example, many contracts require the accumulation of specified minimum tonnages before pickup. The chart below indicates square footage requirements at one and five ton minimum accumulations for various storage alternatives.

	Method of Storage		
Tons	Pallets	Bales	Bulk Containers
1	40 sq.ft.	20 sq.ft.	40 sq.ft.
5	140 sq.ft.	70 sq.ft.	160 sq.ft.

Other sales contracts stipulate specific collection frequencies or pickup days regardless of paper generation rates. For instance, collection might be required once a week or every other Tuesday. Under this type of provision, the space requirements will depend on the amount of paper that is generated between the pickup days.

If the amount of paper produced between pickup days is known (see page 14), space requirements for typical storage methods can be calculated using the data presented below.

	Methods of Storage		
	Pallets	Bales	Bulk Containers
Size	2.5 cu.yd.	6' x 3' x 3'	4 cu.yd.
Capacity	1,500 lbs.	800 lbs.	2,000 lbs.
Approx. space requirements per unit	20 sq.ft.	20 sq.ft.	30 sq.ft.

Recovered paper storage costs can be computed for the Jefferson Building under both contract provisions mentioned above. For example, under a sales contract requiring 5 ton (10,000 lbs.) minimum pickups, up to 140 square feet of storage space will be required prior to shipment if pallets are used for storage (10,000 lbs. ÷ 1,500 lbs./pallet x 20 sq. ft./pallet). Recovered paper storage costs will be $42 per month (140 sq. ft. x $0.30/sq. ft./mo.).

However, if the sales contract requires pickup once a week, only 60 sq. ft. of storage space will be required using the pallet system. This figure is based on an assumed weekly paper recovery rate at the Jefferson Building of 4,500 lbs. (900 lbs./day x 5 days/wk.) which will require storage of three pallets before pickup (4,500 lbs./wk. ÷ 1,500 lbs./pallet). Storage costs in this situation will be $18 per month (60 sq. ft. x $0.30/sq. ft./mo.).

Using the first example of a sales contract requiring 5 ton minimum pickups, fully allocated costs for the storage of both mixed waste and recovered paper at the Jefferson Building would be $120 per month ($48/mo. (mixed waste) + $42/mo. (recovered paper)). Actual costs will remain the same if no additional storage space and handling equipment is purchased due to implementation of the paper recovery program.

Storage	Before paper recovery	Fully allocated costs after paper recovery	Actual costs after paper recovery
- containers	(provided by contractors)		
- equipment		$ 30	
- space			
• mixed waste @ 160 sq. ft.	$48	$ 48	$48
• recovered paper @ 140 sq. ft.		$ 42	
	$48	$120	$48

SOLID WASTE ADMINISTRATIVE COSTS

The cost of administering office waste handling systems is usually considered to be a general overhead expense which is expressed as a percentage of the costs of equipment, storage space, and operating labor. Ten percent of the sum of these three costs is the figure most commonly assumed for estimating general overhead. For example, in the Jefferson Building general overhead before paper recovery would be $419 per month:

($3,960/mo. (labor) + $180/mo. (equipment) + $48/mo. (storage space)) x 10% (overhead rate) = $419/mo.

Due to the increase in labor, equipment and storage space requirements after paper recovery, the general overhead will increase to $488 per month on a fully allocated basis, and $422 per month on an actual cost basis:

Fully allocated: ($4,140/mo. (labor) + $216/mo. (equipment) + $120/mo. (building space)) x 10% = $448/mo.

Actual costs: ($3,960/mo. (labor) + $216/mo. (equipment) + $48/mo. (building space)) x 10% = $442/mo.

All too often, the administrative requirements for any type of solid waste handling program receive low priority resulting in marginal system operations. It is particularly important that this does not happen with the paper recovery program. Additional overhead expenses are estimated for the paper recovery program in order to emphasize that supplemental administrative time must be spent on the program to ensure its satisfactory operation. In addition, the publicity and educational materials which must be procured are considered to be an overhead expense.

EPA studies indicate that successfully implemented programs have required up to one man-month per 500 office employees for an initial period of approximately two months, and 5 percent of one person's time thereafter for various on-going administrative responsibilities. Great variations exist in these requirements. For example, one person working full time for one month may implement a program in a large building of 1,000 to 2,000 workers. Full service contractors may provide up to eight man-hours per 100 employees administrative assistance during program implementation; this will tend to reduce in-house time requirements depending upon how the program is implemented.

Although there was large variation between programs, EPA data indicate that, on the average, 10 hours per 100 employees are required for the implementation phase of the paper recovery program and 16 minutes per 100 employees thereafter. * These averages are based on time requirements for buildings ranging in size from 500 to 3,000 employees. Time per 100 employees required to manage the programs is comparable for all buildings, regardless of size.

The amount of time required to implement and manage the paper recovery program at the Jefferson Building would be estimated as follows:

- Implementation: 1,800 employees x 10 hrs./100 employees = 180 hrs.
- On-going implementation: 1,800 employees x 16 minutes/100 employees/mo. = 5 hrs./mo.
- Management costs after program implementation: assuming a rate of $8/hr., the fully allocated costs of on-going program administration would be $40/mo. (5 hrs./mo. x $8/hr.).

**The figure includes initial employee publicity and education as well as general administration time requirements.*

In most cases, the additional time required for administration of the program can be absorbed by the existing staff. Under these circumstances, no impact would be made on the current operating budget and no additional costs would be incurred.

COSTS OF PUBLICITY AND EDUCATIONAL MATERIAL AFTER PROGRAM IMPLEMENTATION

In EPA studies the fully allocated (and actual) costs for publicity and educational material (posters, notices, etc.) averaged $7 per 100 employees for program implementation and $1 per 100 employes per month thereafter. Under a full service contract, most of this material is provided and no incremental costs for publicity would be incurred. However, if the Jefferson Building is not selling its paper under a full service contract, the on-going cost of publicity and educational materials is estimated to be $18 per month ($1/100 employees/mo. x 1,800 employees).

Administration	Prior to paper recovery	Fully allocated costs after paper recovery	Incremental costs after paper recovery
- general overhead @ 10% of labor, equipment and storage	$419	$448	$422
- source separation @ $8/hr.		40	
- publicity and education materials		18	18
Total Administration	$419	$506	$440

WASTE DISPOSAL COSTS

Hauling and disposal is the final step in the mixed waste handling process. Most facilities contract with private hauling firms or receive municipal collection service. In any case, this final process involves the transportation of mixed wastes to local disposal sites at regular intervals.

The cost of these hauling and disposal services varies according to the number and size of storage containers serviced, the frequency of pickups, and local factors such as distance to the disposal site and tipping fees.

In general, waste disposal charges are determined in one of the following ways:

- A contracted weekly, monthly, or yearly flat fee
- A fee for each "pull" of the waste storage container or containers plus a fee for renting the containers themselves.
- A fee for each ton hauled.

The first two approaches are by far the most common in large office buildings. The 30 cu. yd. container at the Jefferson Building for instance might be "pulled" three times a week for a fee of $100 per pull plus $50 per month for rental of the compactor; or a flat fee of $1,000 per month could be charged regardless of the number of containers pulled.

Actual disposal cost data should be used to complete this analysis when available in a complete and suitable form. However, for developing monthly disposal cost estimates before and after implementation of a paper recovery program, an average cost per ton based on EPA case studies representing all three approaches will be used. This will greatly facilitate completing this analysis, because a significant amount of effort may be required by some organizations to develop meaningful cost data from disposal contracts that greatly vary from case to case.

Before Paper Recovery. In buildings studied by EPA, the hauling and disposal costs averaged between $25 to $30 per ton for general office buildings. These costs included the provision of containers or stationary compactors for waste storage. Assuming that waste is being generated at a rate of 1.55 lbs. per employee per day and there is a hauling and disposal charge of $27.50 per ton of waste, the facility housing 1,800 employees would incur a monthly disposal cost of $844.

After Paper Recovery. The quantities of waste diverted through the desk-top container source separation program in office buildings range from 10 to 80 percent of the mixed waste streams on a weight basis. The amount of paper diverted depends upon the amount of high-grade paper present in the waste stream and the percentage of this amount actually recovered or "captured." As discussed on page 2, bank and insurance facilities generate considerably higher percentages of high-grade wastepaper than general office buildings which partially explains the wide range of diversion rates. Capture rates also vary depending

upon how well the program is implemented and operated.

There should be a thorough investigation of possible reductions in disposal costs that may be effected through the diversion of a significant percentage of the waste stream for recycling. For example, an estimated 900 lbs. of wastepaper will be diverted from disposal each working day at the Jefferson Building. The municipality or the private hauler providing the collection service should be contacted and a reduction in hauling fees should be negotiated to reflect the decreased quantity of waste being handled. This may be done by reducing the number of containers in a multi-container system or reducing the number of "pulls" if a single large stationary compactor is used.

In the Jefferson Building for instance, the number of container pulls might be reduced from three to two times per week, thereby reducing monthly disposal costs by $500. The EPA case study site that reduced the number of 1.5 cu. yd. containers from 22 to 16 after implementation of a paper recovery program reduced its disposal cost by $200 per month. In other cases, flat monthly rates can be reduced.

The average monthly disposal cost may not be reduced in direct proportion to the reduction of the waste stream tonnage flow. For instance, facilities which dispose of bulky items such as wood pallets and corrugated boxes may not significantly reduce the volume of their waste if it is not compacted. As a result, the storage and collection frequency requirements would remain virtually the same, even though the hauling weight would be reduced. In addition, disposal cost reductions may be precluded by:

- Existing contractual agreements with the hauler and/or pricing mechanisms limiting the negotiation of cost reductions based upon flow reductions.

- Complicated leasing arrangements which prevent the negotiation of cost reductions in rented buildings where the lessor has the responsibility for disposal contracts.

Assuming a recovery rate of 0.5 lbs. of paper per employee per day (a waste diversion rate of 32 percent) the reduction in average monthly waste disposal costs for the Jefferson Building may be determined as follows:

- Under a fully allocated approach taking maximum advantage of the waste flow diversion, monthly costs would be reduced to $574 per month since costs are reduced by $270 ($844/mo. x 32%):

  $844/mo. - $270/mo. = $574/mo.

However, in facilities studied by EPA, the disposal cost was reduced, on the average, by half the percentage that the waste stream was reduced. For example, if the weight of the waste stream was reduced by 40 percent after program implementation, a 20 percent reduction in disposal cost resulted. This 2 to 1 ratio indicates an inability to fully reflect the economic advantages of waste reduction for reasons cited above.

- Taking this into consideration, the actual reduction in disposal costs will be $135 per mo. for the Jefferson Building ($844/mo. x 16% disposal cost reduction). The actual cost after the paper recovery program is implemented is $709 per month or $135 less than before program implementation:

  $844/mo. - $135/mo. = $709/mo.

Disposal	Disposal costs prior to paper recovery	Fully allocated costs after paper recovery	Actual costs after paper recovery
- mixed waste @ $27.50/ton	$844	$574	$709

REVENUES

The most important factor in guaranteeing the economic success of an office wastepaper recycling program is the amount of revenue that is derived from sale of the recovered paper. This revenue must offset any costs incurred by the program for additional collection labor, equipment, and storage space. The amount of money generated depends upon many factors: the quantity of paper that is recovered, the level of contamination, transportation costs, and the general state of the secondary paper market at the time of contract negotiation.

Any organization considering an office wastepaper recycling program should conduct a market

survey to determine the potential revenue. In many cases, the local markets may be assessed by making a few phone calls to local wastepaper dealers, industry associations, or manufacturers utilizing high-grade wastepaper (such as producers of offset printing, tissue, and copy papers). Large organizations may have special departments or agencies which handle contracting arrangements for wastepaper sales, such as the General Services Administration in the federal government. These groups should be contacted regarding price structure and the provisions of existing contracts. As stated on page 10, a contract should stipulate a minimum price and should cover a specified period of time.

Assuming a price of $60 per ton for recovered paper, monthly revenues at the Jefferson Building which recovers 0.5 lbs. per employee per day (9.9 tons per month) of white ledger would be $594. (9.9 tons per month x $60 per ton). The revenue produced by the paper recovery program is equal under both the fully allocated and actual cost accounting approaches.

Savings	Prior to paper recovery	Fully allocated after paper recovery	Actual costs after paper recovery
- revenue			
• recovered paper @ $60/ton		$594	$594

NET SOLID WASTE MANAGEMENT COSTS

Net solid waste management costs prior to paper recovery are computed by adding the subtotaled costs for collection labor, collection equipment, storage, administration, and disposal. Net costs after paper recovery program implementation are computed by subtracting monthly paper sales revenue from the total solid waste management costs under both the fully allocated and actual costs columns. The difference in the computed net solid waste management costs under the fully allocated and actual costs columns ($4,962 vs. $4,779) is due to the Jefferson Building's ability to provide collection labor, storage space and equipment, and administrative time for program operation without actual budget change. The Jefferson Building's ability to significantly reduce disposal costs also resulted in a net solid waste management cost reduction.

POTENTIAL SAVINGS

Potential savings after paper recovery program implementation are computed by subtracting the net solid waste management costs under the fully allocated cost ($4,962) and actual cost ($4,779) columns from the net solid waste management cost prior to paper recovery program implementation column ($5,451). Potential savings at the Jefferson Building are $489 per month under the fully allocated cost approach and $672 under the actual cost approach.

Fully allocated: $5,451 - $4,962 = $489

Actual: $5,451 - $4,779 = $672

CONCLUSIONS

Implementation of a high-grade paper recovery program that will result in savings comparable to the Jefferson Building can be accomplished through proper administration on the part of the implementing organization and through the cooperation of all employees. The case studies serving as the basis for the development of data for this cost analysis did this by:

- Designating a capable Program Coordinator.
- Establishing an appropriate long-term marketing arrangement (i.e., a contract).
- Developing and implementing a reliable collection system.
- Conducting an effective employee publicity and education campaign.

Source separation and recycling of high-grade paper helps to conserve a resource with significant economic and environmental value. At the same time, it effectively reduces solid waste quantities generated by office buildings which, in turn, reduces building management costs. High-grade paper recovery programs can achieve high levels of participation and reduce building management costs significantly by systematically following the implementation and administrative procedures described in this manual.

SAMPLE SOLID WASTE MANAGEMENT COST ANALYSIS FORMAT ($/MONTH)
1,800 EMPLOYEES GENERAL OFFICE BUILDING

Contributing Factors	Prior to paper recovery program implementation	Fully allocated costs after paper recovery program implementation	Actual costs after paper recovery program implementation
COSTS			
Collection Labor			
mixed waste @ $5/hr	$3,960	$3,510	$3,960
recovered paper @ $5/hr		630	
Subtotal Collection Labor	$3,960	$4,140	$3,960
Collection Equipment			
mixed waste @ $10/100 employees/month	180	180	180
recovered paper:			
• desk-top containers @ 1/employee		30	30
• central collection containers @ 1/20 employees		3	3
• hand truck @ 1/building		3	3
Subtotal Collection Equipment	$ 180	$ 216	$ 216
Storage			
containers			
equipment		$ 30	
space			
• mixed waste @ 160 sq ft x $0.30/sq ft/ month	$ 48	48	$ 48
• recovered paper @ 140 sq ft x $0.30/sq ft/ month		42	
Subtotal Storage	$ 48	$ 120	$ 48
Administration			
general overhead @ 10% of labor, equipment and storage	$ 419	$ 448	$ 422
source separation administration @ 15 min/100 employees/month x $8/hour		40	
publicity and education materials @ $1/100 employees/month		18	18
Subtotal Administration	$ 419	$ 506	$ 440
Disposal			
mixed waste @ $27.50/ton	$ 844	$ 574	$ 709
Total Solid Waste Management Costs	$5,451	$5,556	$5,373
SAVINGS			
Revenue			
recovered paper @ $60/ ton x 9.9 tons/month		$ 594	$ 594
Net Solid Waste Management Costs	$5,451	$4,962	$4,779
POTENTIAL SAVINGS			
$ per month		$ 489	$ 672

APPENDIX A

MATERIALS RECOVERY GUIDELINES FOR SOURCE SEPARATION (40CFR Part 246)

Subpart B—Requirements and Recommended Procedures

§ 246.200 High-grade paper recovery.

§ 246.200–1 Requirements.

High-grade paper generated by office facilities of over 100 office workers shall be separated at the source of generation, separately collected, and sold for the purpose of recycling.

§ 246.200–2 Recommended procedures: High-grade paper recovery from smaller offices.

The recovery of high-grade paper generated by office facilities of less than 100 office workers should be investigated in conformance with the following recommended procedures and implemented where feasible.

§ 246.200–3 Recommended procedures: Market study.

An investigation of markets should be made by the organization responsible for the sale of recyclable materials in each Federal agency and should include at a minimum:

(a) Identifying potential purchasers of the recovered paper through standard market research techniques;

(b) Directaly contracting buyers and determining the buyers' quality specifications, the exact types of paper to be recycled, potential transportation agreements and any minimum quantity criteria; and

(c) Determining the price that the buyer will pay for the recovered paper and the willingess of the buyer to sign a contract for purchase of the paper at a guaranteed minimum price.

§ 246.200–4 Recommended procedures: Levels of separation.

A two-level separation is recommended for most facilities. This separation should consist of (a) high-grade wastepaper and (b) all other waste. Facilities that produce large enough quantities of waste computer paper and cards to make their separation into a separate category cost effective may choose to implement three levels of separation: (1) computer papers, (2) other high-grade papers, (3) all other wastes.

§ 246.200–5 Recommended procedures: Methods of separation and collection.

(a) Systems designed to recover high grades of office paper at the source of generation, i.e., the desk, are the desk-top system, the two-wastebasket system, and the office centralized container system.

(b) With the desk-top system, recyclable paper is placed by the generator in a container on his desk, while other waste is placed in a wastebasket. With the two-wastebasket system, recyclable paper is placed by the generator in one desk-side wastebasket, and all other waste is placed in another. In the centralized container system, large containers for the collection of recyclables are placed in centralized locations within the office areas of the building. Nonrecyclable waste is placed in desk-side wastebaskets.

(c) The recommended system is the desk-top system because it is designed to maximize recovery of high value material in an economically feasible manner. While the two-wastebasket system and centralized container system have been implemented with success in isolated instances, data indicate that, on the whole, these systems have experienced high levels of contamination, low levels of participation, and low revenues. The desk-top system has been designed to minimize these problems.

(d) The precise method of separation and collection used to implement the desk-top system will depend upon such things as the physical layout of the individual facility, the ease of collection, and the projected cost effectiveness of using various methods. The recommended desk-top system is carried out in the following manner:

(1) Workers are to deposit high-grade paper into a desk-top tray or other small desk-top holder to be supplied by the agency. This holder should be designed in such a way as to prevent it holding contaminants such as food or beverage containers.

(2) At the office worker's convenience or when the tray is filled, the worker carries the paper to a conveniently located bulk container within the office area. This large container should be located in an area the worker frequents in the normal course of business.

(3) In locations where computer cards and printouts are to be collected separately, the receptacle for these wastes should be near the computer terminal or in some other logical, centrally located place.

(4) Collection of the high-grade paper from the bulk containers in the office area should be performed by the janitorial or general maintenance service. The number of locations and the frequency of collection of these containers will be determined by office size and maintenance staff capacity.

(e) Mixed paper and some high-grade office papers have also been recovered for recycling by hand-picking in an individual building's trash room or at a centralized facility serving several buildings. With these hand-picking systems, recyclable waste is not separated at the source of generation, but is mixed with other waste in the usual manner and removed to a centralized location where recyclable paper is picked out of the mixed waste by hand. Facilities may choose to use this method of high-grade paper recovery if it is shown by analysis to be economically preferable to source separation.

§ 246.200–6 Recommended procedures: Storage.

Among the alternatives for paper storage are on-site baling, the use of stationary compactors, or storage in corrugated boxes or normal waste containers. Stored paper should be protected from fire, inclement weather, theft, and vandalism.

§ 246.200–7 Recommended procedures: Transportation.

Transportation to market may be supplied by the facility, by a private hauler, or by the purchaser. Collection of the recyclable paper should be on a regular, established schedule.

§ 246.200–8 Recommended procedures: Cost analysis.

After potential markets have been located (but prior to initiation of formal bidding procedures), preliminary determinations of various separation methods, storage, and transportation costs have been made, and estimated tonnages of both recoverable high-grade paper and residual solid waste have been established an analysis should be conducted which compares the costs of the present waste collection and disposal system with the proposed segregated systems. At a minimum, the study should include all capital, operating and overhead costs and take into account credits for revenue from paper sales and savings from diverting recycled materials from disposal. Potential costs to upgrade collection and disposal practices to comply with EPA's Guidelines for the Storage and Collection of Residential, Commercial and Institutional Solid Wastes (40 CFR Part 243) and Thermal Processing and Land Disposal Guidelines (40 CFR Parts 240 and 241) should be included in the analysis. In formulating a separation system and evaluating its costs, every effort should be made to use janitorial and waste collection resources efficiently. This cost analysis should enable the facility to determine the most cost effective method of implementing the requirement of this part.

§ 246.200–9 Recommended procedures: Contracts.

Formal bids should be requested for purchase of the recovered materials, such bids being solicited in conformance with bidding procedures established for the responsible agency. Contracts should include the buyer's quality specifications, quantity and transportation agreements, a guarantee that the material will be accepted for one year or more, and a guaranteed minimum purchase price.

§ 246.200–10 Recommended procedures: Public information and education.

A well-organized and well-executed public information and education program explaining the justification, goals, methods and level of separation should be conducted to inform and motivate office personnel and secure their cooperation in separating their waste. This public information and education program should precede the program and continue on a regular basis for its duration.

§ 246.201 Residential materials recovery.

§ 246.201–1 Requirement.

Separation of used newspapers at the source of residential generation in conjunction with separate collection shall be carried out at all facilities in which more than 500 families reside, and the newspapers shall be sold for the purpose of recycling.

§ 246.201–2 Recommended procedures: Newsprint recovery from smaller residential facilities.

The recovery of newsprint generated by residential facilities of less than 500 families should be investigated in conformance with the following recommended procedures and implemented where feasible.

§ 246.201–3 Recommended procedures: Glass, cans, and mixed paper separation.

In areas where markets are available, it is recommended that glass, cans, and mixed paper be separated at the source of generation and separately collected for the purpose of recycling.

§ 246.201–4 Recommended procedures: Market study.

An investigation of markets should be made for each material by the organization responsible for sale of recyclable materials in each agency and should include at a minimum:

(a) Identifying potential purchasers of the recovered material through standard market research techniques.

(b) Directly contacting buyers and determining the buyers' quality specifications, potential transportation agreements and any minimum quantity criteria.

(c) Determining the prices that the buyer will pay for the recovered material and the willingness of the buyer to sign a contract for the purchase of the material at guaranteed minimum prices.

§ 246.201–5 Recommended procedures: Methods of separation and collection.

Following separation within the home, any of the following methods of collection may be used:

(a) Materials may be placed at the curbside by the resident and may be collected from each household using separate trucks or compartmentalized vehicles.

(b) For multi-family dwellings, separated materials may be placed in bulk containers located outside of the building and collected by trucks dispatched to collect recyclables.

(c) Collection stations may be set up at convenient locations to which residents bring recyclables. These stations should provide separate bulk containers for each item to be recycled. The size and type of container will depend on the volume and type of material collected, the method of transportation to be used in hauling the materials to market and the frequency of removal.

§ 246.201–6 Recommended procedures: Transportation to market.

Transportation to market may be supplied by the facility or the community generating the waste, by a private hauler, or by the purchaser.

§ 246.201–7 Recommended procedures: Cost analysis.

After potential markets have been located (but prior to initiation of formal bidding procedures), preliminary determinations of various separation methods, storage and transportation costs have been made and estimated tonnages of both recoverable materials and residual solid waste have been established, an analysis should be conducted which compares the costs of the present waste collection and disposal system with the proposed segregated systems. At a minimum this study should include all capital, operating and overhead costs and take into account credits for revenue from paper sales and savings from diverting recycled materials from disposal. Potential costs to upgrade collection and disposal practices to comply with EPA's Guidelines for the Storage and Collection of Residential, Commercial and Institutional Solid Wastes (40 CFR Part 243) and Thermal Processing and Land Disposal Guidelines (40 CFR Parts 240 and 241) should be included in the analysis. In formulating a separate collection system and evaluating its costs, every effort should be made to use idle equipment and underutilized collection manpower to reduce separate collection costs. This cost analysis should enable the facility to determine the most cost effective method of implementing the requirements of this part.

§ 246.201–8 Recommended procedures: Contracts.

Formal bids should be requested for purchase of the recovered materials, such bids being solicited in conformance with bidding procedures established for the responsible jurisdiction. Contracts of trial will be accepted for one year or more should include the buyer's quality specifications, quantity and transportation agreements, a guarantee that the materand a guaranteed minimum purchase price.

§ 246.201–9 Recommended procedures: Public information and education.

A well organized and well executed public information and education program explaining the justification, goals, methods and level of separation should be conducted to inform and motivate householders and to secure their cooperation in separating their waste. This public information and education program should precede the program and continue on a regular basis for its duration.

§ 246.202 Corrugated container recovery.

§ 246.202–1 Requirement.

Any commercial establishment generating 10 or more tons of waste corrugated containers per month shall separately collect and sell this material for the purpose of recycling.

§ 246.202–2 Recommended procedures: Corrugated container recovery from smaller commercial facilities.

The recovery of corrugated containers from commercial facilities generating less than 10 tons per month should be investigated in conformance with the following recommended procedures and implemented where feasible.

§ 246.202–3 Recommended procedures: Market study.

An investigation of markets should be made by the organization responsible for sale of recyclable material in each Federal agency and should include at a minimum:

(a) Identifying potential purchasers of the recovered corrugated through standard market research techniques.

(b) Directly contacting buyers and determining the buyers' quality specifications, potential transportation agreements and any minimum quantity criteria.

(c) Determining the price that the buyer will pay for the recovered corrugated and the willingness of the buyer to sign a contract for purchase of the paper at a guaranteed minimum price.

§ 246.202–4 Recommended procedures: Methods of separation and storage.

The method selected will depend upon such variables as the physical layout of the individual generating facility, the rate at which the corrugated accumulates, the storage capacity of the facility, and the projected cost-effectiveness of using the various methods. All of the following suggested modes of separation and storage presuppose that the corrugated boxes will be accumulated at a central location in the facility after their contents are removed and that the boxes are flattened.

(a) Balers of various sizes: corrugated boxes are placed in balers and compacted into bales. These bales may be stored inside or outside of the facility. The bales should be protected from fire, inclement weather, theft, and vandalism.

(b) Stationary compactors or bulk containers: corrugated boxes are placed in a stationary compactor or bulk containers outside of the facility. The containers should be protected from fire, inclement weather, theft and vandalism.

§ 246.202–5 Recommended procedures: Transportation.

Transportation to market may be supplied by either the facility, a private hauler or the purchaser. In facilities to which goods are delivered from a central warehouse, corrugated may be backhauled by delivery trucks to the central facility and baled there for delivery to a user.

§ 246.202–6 Recommended procedures: Cost analysis.

After potential markets have been identified (but prior to initiation of formal bidding), preliminary determinations of various separation methods, storage and transportation costs have been made, and estimated tonnages of both recoverable material and residual solid waste have been established, an analysis should be conducted which compares the costs of the present waste collection and disposal system with the proposed segregated systems. At a minimum, the study should include all capital, operating and overhead costs and take into account credits for revenue from paper sales and savings from diverting recycled materials from disposal. Potential costs to upgrade collection and disposal practices to comply with EPA's Guidelines for the Storage and Collection of Residential, Commercial and Institutional Solid Wastes (40 CFR Part 243) and Thermal Processing and Land Disposal Guidelines (40 CFR Parts 240 and 241) should be included in the analysis. This cost analysis should enable the facility to determine the most cost effective method of implementing these guidelines.

§ 246.202–7 Recommended procedures: Establishment of purchase contract.

Formal bids should be requested for purchase of the recovered materials, such bids being solicited in conformance with bidding procedures established for the responsible agency. Contracts should include the buyer's quality specifications, transportation agreements, a guarantee that the material will be accepted for one year or more and a guaranteed minimum purchase price.

§ 246.203 Reevaluation.

§ 246.203–1 Requirement.

Agencies in which facilities make the determination not to comply with these guidelines must conduct the required analysis and report in accordance with § 246.100 (e) or (f), as appropriate, yearly.

APPENDIX B

General Services Administration
Sample Bid Specification Provisions

Technical provisions of the GSA bid specification for the sale of office wastepaper generated through source separation programs are presented in this appendix. General provisions not relating specifically to source separation program requirements are excluded from this sample. Regional GSA sales offices should be contacted for information on the complete set of provisions included in the Bid specifications.

SCOPE OF CONTRACT

This invitation is for bidders who wish to submit bids for the purchase of accumulations of surplus personal property consisting of high-grade wastepaper which is generated in the daily operation of government facilities and source separated through a recycling program provided by the bidder as specified herein, from the (buildings' names, addresses, and approximate number of employees) during the period _____(or date of award, whichever is later) through _____. Award under this invitation does not grant the successful bidder exclusive rights to all wastepaper products generated in any award location. Nothing herein shall be construed as requiring the disposal hereunder of new and additional grades of wastepaper developed during the period of this contract. Estimated tonnage of the offered wastepaper is based on the best available information to the Government at the time of this invitation. The Government does not guarantee these estimates and payment must be made on the actual tonnage delivered.

SPECIAL SALE TERMS AND CONDITIONS

1. RECYCLING PROGRAM

Bidders are responsible for developing and implementing a complete program for the recovery of source separated high-grade wastepaper generated in the daily operation of Government facilities included in this invitation.

Contractor Responsibilities

Under this program, the contractor agrees to provide:

a. A written plan to include a description of the procedures for and the technical assistance to be provided in establishing and maintaining a desk-top source separation system in accordance with the requirements of this invitation. Such procedures and assistance shall include an employee publicity and educational program consisting of training sessions utilizing visual aids, written materials, and other educational devices. Such training sessions shall be scheduled for presentation to participating Government personnel, as soon as feasible after date of award and no later than thirty (30) days after the beginning date of the contract period, subject to the approval and coordination of the Government. Wastepaper will not be collected prior to the training sessions and delivery and distribution of the desk-top collection receptacles and the collection and storage containers described below.

b. Desk-top collection receptacles for each employee. The receptacles shall be fabricated from plastic of a quality suitable for the intended use. The receptacles shall be designed with a base and two upright sides. The two ends and the top shall be open to permit paper to be placed between the uprights. The receptacles may be one piece formed as above or may be formed by using two interlocking sections. The paper receptacles shall be sufficiently stable to permit one unwrapped ream of bond paper to be placed in the receptacle without tipping over. Maximum outer dimensions shall be 8-1/4" x 4-1/4" x 7'1/2" (length, width, height). The interior capacity of the receptacle shall be not less than 2-1/4 inches. The color of the receptacle shall be either black, beige or white. The receptacles shall have no sharp edges or projections which might cause injury or might scratch or mar desk-top surfaces. A brief description of acceptable white paper and unacceptable items shall be clearly indicated on each receptacle (see note under (e)).

c. Central collection containers for every twenty (20) employees. The containers shall be fabricated from corrugated fiberboard, single wall variety, of a quality suitable for the intended use. The containers shall be of a top-loading box design and solid in color. Top flaps are not required, however, if the containers provided have top flaps, they will be folded inward to provide an open top. Maximum outer dimensions shall be 18" x 12" x 12" (length, width, height). Minimum outer dimensions shall be 16" x 10" x 10". The containers shall have no projections which might cause injury and shall be clearly labeled for use only in the recycling program for the accumulation of high-grade wastepaper (see note under (e)).

d. Storage containers for use in the designated storage area for storage prior to removal by the contractor. Containers may consist of pallet size boxes, 4' x 4' x 5' (and pallets), fiberboard cartons, canvas hampers, or any other container which meets the approval of the Contracting Officer (see note under (e)).

e. In the event that manila tabulating cards are included as a subitem under this contract (see Bid Page(s), pgs. _____), separate central collection containers (e.g., hampers or boxes located in a computer room) and separate storage containers will be required for the accumulation of such tab cards source separated at data processing or similar facilities.

Note: Additional desk-top collection receptacles, central collection containers, storage containers, storage containers, and any necessary equipment (e.g., pallets) shall be provided at the contractor's expense within five (5) working days of notification by the Government in the event of theft, breakage, loss, or the addition of new employees. The contractor will be responsible, subject to the approval of and coordination with the Government, for delivery and distribution of the receptacles, containers, and any necessary equipment at the start of the program and as required during the term of the contract, and for removal of same at the termination of this contract. All receptacles, collection containers, storage containers, and other necessary equipment remain the contractor's property.

f. Necessary labor and equipment, which may include banding and/or palletizing, to prepare wastepaper for removal from the designated storage area to the contractor's truck.

g. Necessary labor and equipment to remove wastepaper from the designated storage area and to load wastepaper into the contractor's truck at the loading dock.

Government Responsibilities

Under this program, the Government agencies occupying and/or operating the facilities covered by this contract agree to provide:

a. A program coordinator for each facility, and time and location for the training of all participating employees subject to the approval of the program coordinator.

b. A designated storage area(s) in each facility, in the vicinity of the loading dock(s), for the storage of the accumulated source separated wastepaper prior to pickups by the contractor.

c. Labor and equipment associated with moving wastepaper within the building and delivery of the wastepaper (including manila tabulating cards, if included as a subitem under this contract, source separated to the extent feasible at data processing and similar facilities and not mixed with desk-top collected white ledger) to the designated storage area.

2. REMOVAL OF PROPERTY

If this contract covers more than one grade (subitem) of wastepaper, the contractor is required to remove and weigh each grade of wastepaper separately. It is recognized that benefits for the contractor depend on the quantities to be picked up. Government facilities participating in this sale are required to have available for pickup at least a truckload of one grade of wastepaper based on their best estimate, before calling contractor for removal, but the contractor is not required to remove the wastepaper upon call as specified herein if the amount of wastepaper does not equal at least 80% of a truckload quantity. However, the contractor has the option of picking up smaller quantities of wastepaper with the consent of the Government.

3. PRE-AWARD INSPECTION

To be considered for award, bidder must be regularly engaged in the wastepaper removal or paper recycling business, or if newly entering the field, he must furnish evidence that all necessary prior arrangements (written commitments) for supplies, equipment, and personnel have been made. The bidder's facilities, equipment, recycling program, receptacles and containers, and financial responsibility, including those of contemplated subcontractors, will be subject to pre-award inspection. If requested by the Contracting Officer, bidders will submit, within two (2) weeks after the date of such request, a copy of the bidder's written plan and publicity and educational materials described in paragraph (a) of the clause entitled "Recycling Program," two samples of the receptacles and containers described in paragraphs (b) and (c) of that clause, and a description of the container(s), any necessary equipment, and the method of removal from the storage areas referred to in paragraphs (d), (e), (f), and (g) of that clause, in order to assist the Contracting Officer in determining the bidder's responsibility. A bidder may be rejected as nonresponsible if it is determined that the bidder fails to meet the minimum standards for responsible prospective contractors contained in 41 CFR 1-1.1203.

4. METHOD OF AWARD

The contract will be awarded to that responsible bidder whose bid conforming to the invitation will be most advantageous to the Government, price and other factors considered. Award will be made by service area, at the highest return to the Government, on the basis of the best single dollar figure bid per ton, either as a reduction from or addition to the full average market price, as determined under the clause entitled "Method of Establishing Monthly Billing Prices." In order

to be considered for an award, the bidder must insert a plus (+) dollar figure (e.g., +$5.00), and those desiring to bid below full average market price will enter a minus (-) dollar figure (e.g., -$10.50). If the word "net" is entered as the bid, it will be interpreted as "0." In the absence of either a numerical figure, or the word "net," or "0," the bid will be deemed a "No Bid" for that service area. A written award mailed (or otherwise furnished) to the successful bidder within the time for acceptance provided in the invitation shall be deemed to result in a bidding contract without any further action by either party.

5. METHOD OF ESTABLISHING MONTHLY BILLING PRICES

Monthly billing prices shall be established by using the average of the highest prices quoted for White Ledger for the (Area) Market, and, if included as a subitem in this contract, for Manila Tab Cards for the (Area) Market in those issues of the "Official Board Market,"* (published by the Board Products Publishing Company, 228 LaSalle Street, Chicago, Illinois) dated within the month in which the paper was removed. The prices which the successful bidder will pay the Government per ton for each subitem (grade) of wastepaper removed during a calendar month shall be determined by adding or subtracting the (plus, minus, or "0") dollar figure bid per ton, entered in the appropriate space on the Bid Page(s), (pg(s) _____) to or from (as appropriate) the average price stated above for White Ledger (and, if applicable, for Manila Tab Cards), as illustrated in the example below. IN NO EVENT SHALL THE MINIMUM PRICE TO BE PAID TO THE GOVERNMENT FOR WASTEPAPER DISPOSED OF UNDER THIS CONTRACT BE LESS THAN $30 PER TON.

*If for any reason the publication, "Official Board Market," becomes unavailable, a source of information acceptable to the Contracting Officer and the contractor shall be used as a basis for determining the prices to be paid for wastepaper purchased and removed under this contract.

EXAMPLE OF METHOD USED TO COMPUTE MONTHLY BILLING PRICE

If the dollar figure quoted was minus (-) $10.50 from the full average market price, the price paid to the Government for White Ledger paper removed during a hypothetical month of October would be computed as follows (if Manila Tab Cards are included as a subitem under this contract, separate computations would be made to determine the price to be paid for that grade of paper):

Issue published October 7	$ 95.00 per ton
Issue published October 14	$ 95.00 per ton
Issue published October 21	$ 95.00 per ton
Issue published October 28	$100.00 per ton
	$385.00 - 4 (number of issues of the publication during the month) = $96.25 average price.

$96.25 minus $10.50 equals $85.75 (Price to be paid to the Government).

Note: Dollar figures are rounded to nearest cent.

BID PAGE

BEFORE BIDDING, SEE "METHOD OF AWARD" CLAUSE . . .

The tonnage of wastepaper stated below for each category of wastepaper represents the Government's best estimate of the per month amount to be generated. The Government does not guarantee the estimates and payment must be made on the actual tonnage delivered.

Service Area: _____.

	Bid Quotation (+ or - dollar figure per ton, or "net" or "0")
Location of Property: (Buildings' names, addresses, custodian telephone No. Government scales available at _____.)	
1. High-Grade Wastepaper as follows:	
a. White Ledger, as defined under the clause entitled "Special Definitions," source separated using desk-top collection receptacles, and stored in accordance with the terms and conditions of this contract, estimated to total ___ ton(s) monthly.	$ _____ (indicate) (indicate dollar figure per ton, or "net" or "0")

A single bid must be made for all high-grade wastepaper in the form of a dollar figure (plus, minus, or "net" or "0") in accordance with the clause entitled "Method of Award." This dollar figure will be applied to the full average market price for each subitem in accordance with the clause entitled "Method of Establishing Monthly Billing Prices."

If the bidder has any questions or need for clarification regarding any part of this invitation, the bidder must contact General Services Administration, Region ___, Federal Supply Service, Personal Property Division, etc., Telephone No. _____, prior to the time set for bid opening.

6. SPECIAL DEFINITIONS

(1) White Ledger, as used herein, consists of all white sheets and shavings of untreated ledger bond, writing papers, and other hard papers which have similar fiber content, and must be free of solid color printing. This grade may contain sulphite peper containing a trace of groundwood. For purposes of this bid, it also may include manila tabulating cards and computer printout which are not separated at data processing and similar facilities. Outthrows are not to exceed 2.0% of the boxed weight less skid weight. Prohibitive materials are not permitted.

(2) Tabulating Cards, Manila, as used herein, consist of printed manila-colored cards, predominantly sulphite or sulphate, which have been manufactured for use in tabulating machines. This grade may contain manila-colored tabulating cards with tinted margins but may not contain beater or calendar-dyed cards in excess of 1/2 of 1%. Outthrows are not to exceed 2.0% of the bosed weight less skid weight. Prohibitive materials are not permitted.

(3) Outthrows, as used herein, consist of all papers that are so manufactured or treated or are in such a form as to be unsuitable for consumption as the grade specified.

(4) Prohibitive Materials, as used herein, consist of any materials which by their presence in an accumulation of wastepaper, in excess of the amount allowed, will make the accumulation unusable as the grade specified; and any materials that many be damaging to equipment.

(5) Ton(s) and tonnage, as used herein, refer to net short tons of wastepaper.

APPENDIX C
WASTE COMPOSITION SAMPLING PROCEDURE

1. Separate a representative mixed waste sample of about 50 lbs. from a collection cart or storage bin placing it in a container of known volume and weight.

2. Weigh the sample and estimate the volume (cubic feet or yards). Example:
   - Estimated volume of the sample = 2.5 cu.ft. (0.09 cu.yd.).
   - Gross sample weight 35.6 lbs.
     - container weight 1.0 lbs.
     Net sample weight 34.6 lbs.

3. Compute density (lbs./cu. yd.) by dividing net sample weight (lbs.) by estimated sample volume (cu. yds.):
   - 34.6 lbs. ÷ 0.09 cu. yds. = 384 lbs./cu. yd.

4. Divide the sample into components listed in the following waste generation and composition tally sheet, placing each material in a corrugated box or other container whose empty weight has been recorded.
   - Weigh each box separately and subtract the container weight to obtain the net material weight.
   - Compute the percentage of total weight represented by each material.

   These four steps should be repeated several times in order to develop valid density and composition averages.

Sample Weight 34.6 lbs.	Total lb.	Total %
Paper		
White ledger	13.9	40.2
Colored ledger	1.1	3.3
Computer tab cards	0.2	0.7
Computer printout	3.6	10.6
Newsprint	4.3	12.5
Corrugated	1.9	5.6
Books	0.6	2.0
Cardboard files	0.8	2.5
Other	3.0	8.9
Garbage	1.1	3.3
Metals and Glass	1.7	5.1
Textiles, Plastics, and Wood	0.4	1.6
Special	1.3	3.8
TOTAL	34.6	100.1

5. Once the average density and composition are known, various conclusions can be drawn.
   a. Multiplying the density by the cu. yd. disposed of each month yields an estimate of total monthly solid waste generation.
   b. Using composition percentages, the total generation can be broken down into individual material groups to give an indication of the quantities of high-grade paper in the wastestream.

Compactor Capacity	Number Emptied per Month	% Full When Emptied	cu yds/ Month
40 cu yd	4	100%	160
384 lbs/cu yd x 160 cu yd/month = 61,400 lbs/month or 30.7 tons/month.			

Type of High-Grade Paper	Total Waste Generation	x	% of Paper in the Wastestream	=	Generation of Paper
White ledger	30.7 tons/mo	x	40.2%	=	12.3 tons/mo
Tab cards	30.7 tons/mo	x	0.7%	=	430 lbs/mo
Computer printout	30.7 tons/mo	x	10.6%	=	3.2 tons/mo

APPENDIX D
PAPER GRADE DEFINITIONS * †

White Ledger

No. 1 sorted white ledger consists of printed or unprinted sheets, shavings, and cuttings of white sulphite or sulphate ledger, bond, writing, and other papers which have a similar fibre and filler content. This grade must be free of treated, coated, padded, or heavily printed stock.

Prohibitive materials ‡ - None permitted.
Total outthrows * * - May not exceed 2%.

All white paper with black ink is typically high-grade white ledger. There are two kinds of paper that qualify as white ledger:

- Sulphites - lightweight office papers (bond, Xerox paper, onion skin).
- Sulphates - heavy white or colored papers used most commonly in mailing (envelopes, business cards, report covers).

Most office papers are sulphites, although there are a few low grade office papers which are considered in the news or a mixed category because of the ground wood content. These are contaminants in high grade stock.

Other forms of white ledger are the blue and green striped computer printouts and non-glossy pages of books and magazines.

Colored Ledger

No. 1 sorted colored ledger consists of printed or unprinted sheets, shavings, and cuttings of colored or white sulphite or sulphate ledger, bond, writing, and other papers which have a similar fibre and filler content. This grade must be free of treated, coated, padded, or heavily printed stock.

Prohibitive materials - None permitted.
Total outthrows - May not exceed 2%.

Sorted Brown Kraft. Consists of baled clean sorted brown kraft papers free from twisted or woven stock, sewed edges, and heavy printing.

Prohibitive materials - None permitted.
Total outthrows - May not exceed 2%.

**Pioneer Paper Stock Division of Container Corporation of America.*

†Paper Stock Standards and Practices, Circular PS-74, Paper Stock Institute of America, January 1, 1974.

‡Prohibitive materials: a) Any materials which by their presence in a packing of paper stock, in excess of the amount allowed, will make the packing unusable as the grade specified. b) Any materials that may be damaging to equipment.

***Outthrows: Outthrows shall be understood to be all papers that are so manufactured or treated or are in such form as to be unsuitable for consumption as the grade specified.*

Contaminants

Anything other than the material tolerances specified in each grade is considered a contaminant. Most paper buyers reject contaminated loads or lower the purchase price to a mixed grade to compensate for the extra separation entailed.

Envelopes with windows not made of cellophane are contaminants. Metal in the form of staples and/or paper clips is allowable in minor amounts (a ton of envelopes with paper clips on each is considered a contaminated load).

Domestic markets will accept mixed white and colored computer paper; foreign markets cannot.

Magazines are high in clay content and are considered low grade. Books with bindings are glue intensive and are contaminants - although without binding, most books (not including glossy) are high-grade white.

Any paper that is a sulphate or a sulphite paper that is other than white is considered colored ledger. Generally, any paper that is white (sulphate or sulphite) with other than black ink is also considered colored ledger. Natural kraft envelopes are specified in a separate category but may be mixed with colored ledger in small amounts. Blueprints are accepted as colored ledger if less than 20 percent of the whole amount being marketed. Computer printouts with colors **other** than blue and green stripes are considered colored ledger. Similar to the white ledger grade, ground wood content is considered a contaminant in colored ledger.

Tab Cards

Colored tabulating cards consist of printed colored or manila cards predominantly sulphite or sulphate which have been manufactured for use in tabulating machines. Unbleached draft cards are not acceptable.

Prohibitive materials - None permitted.
Total outthrows - May not exceed 1%.

Manila tabulating cards consist of printed manila-colored cards, predominantly sulphite or sulphate, which have been manufactured for use in tabulating machines. This grade may contain manila-colored tabulating cards with tinted margins.

- Prohibitive materials - None permitted.
- Total outthrows - May not exceed 1%.

Manila folders are included in these categories.

Other Wastepaper Categories

No. 1 News. Consists of baled newspapers containing less than 5% of other wastepapers.

- Prohibitive materials - May not exceed ½ of 1%.
- Total outthrows - May not exceed 2%.

Corrugated. Consists of baled corrugated containers having liners of either jute or kraft.

Prohibitive materials - may not exceed 1%.
Total outthrows - May not exceed 5%.